Geol

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and CEMENT and ENGINEERING NEWS (Est. 1896)

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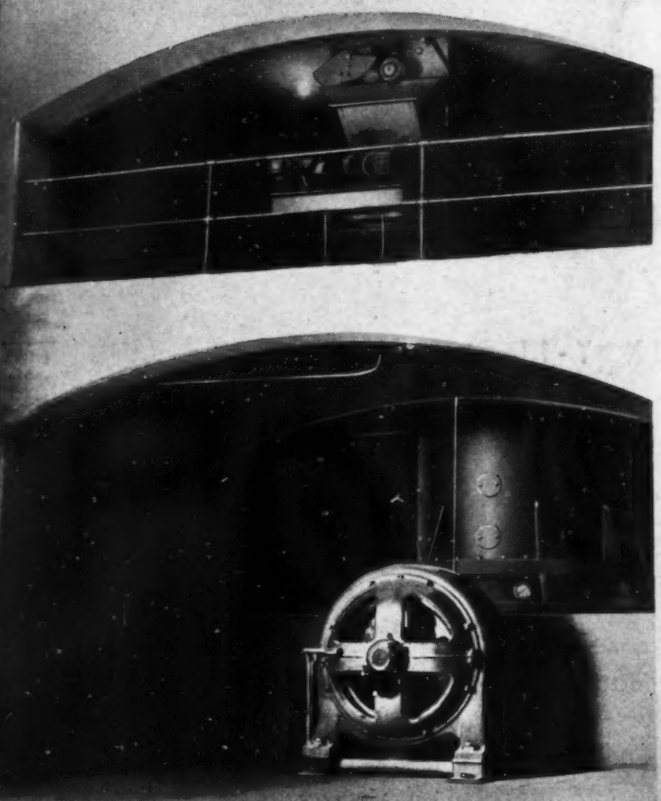

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Improved fineness.

Connected horsepower reduced from 950 to 528

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C-5

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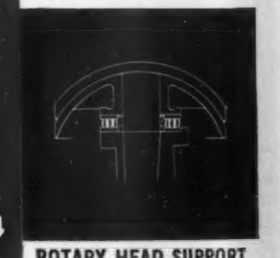
1 CHOKE FEED

2 SPRING RELIEF

3 SPHERICAL HEAD



4 ROTARY HEAD SUPPORT

WRITE FOR BULLETIN Y-11

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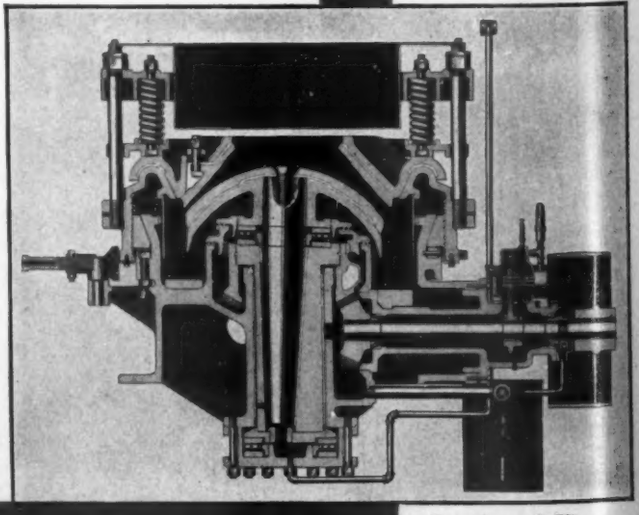

Sectional View of Telsmith Gyrasphere Crusher

TELSMITH GYRASPHERE

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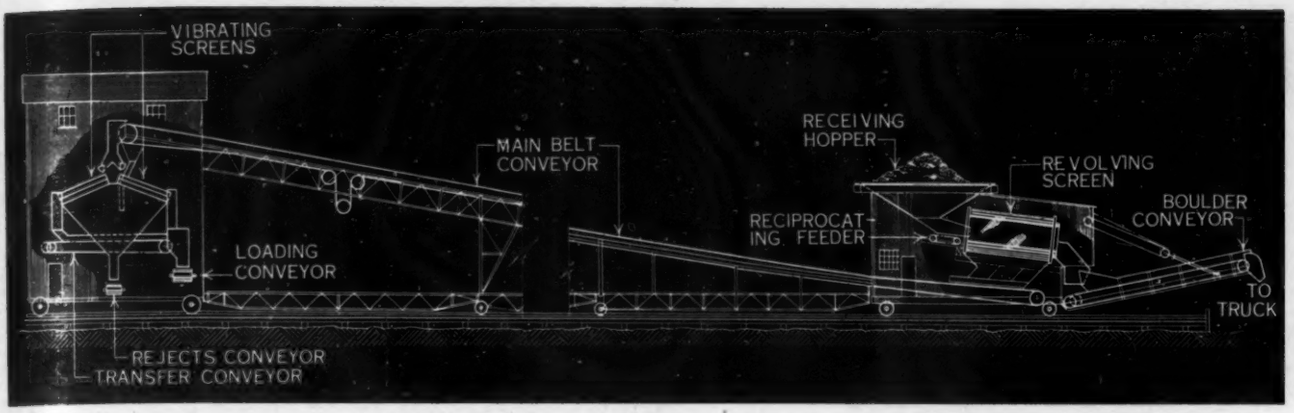

Preparing Screened "Toe" Gravel for Fort Peck Dam

THE gravel for the toe or bottom of the slope of this earth-filled dam is furnished by the two Link-Belt traveling plants of the Becker County—Shiely Co., one of which is illustrated here. To date, these plants have completed turning out their first quota of approximately 2½ million cubic yards and are now ready to produce 1¼ million more, the contract for which was awarded late last year.

The gravel is loaded into R. R. cars for delivery to the dam. The sand is screened out and returned to the pit, and the oversize is delivered to trucks for disposal. The capacity of each plant is 550 tons per hour of pit-run material.

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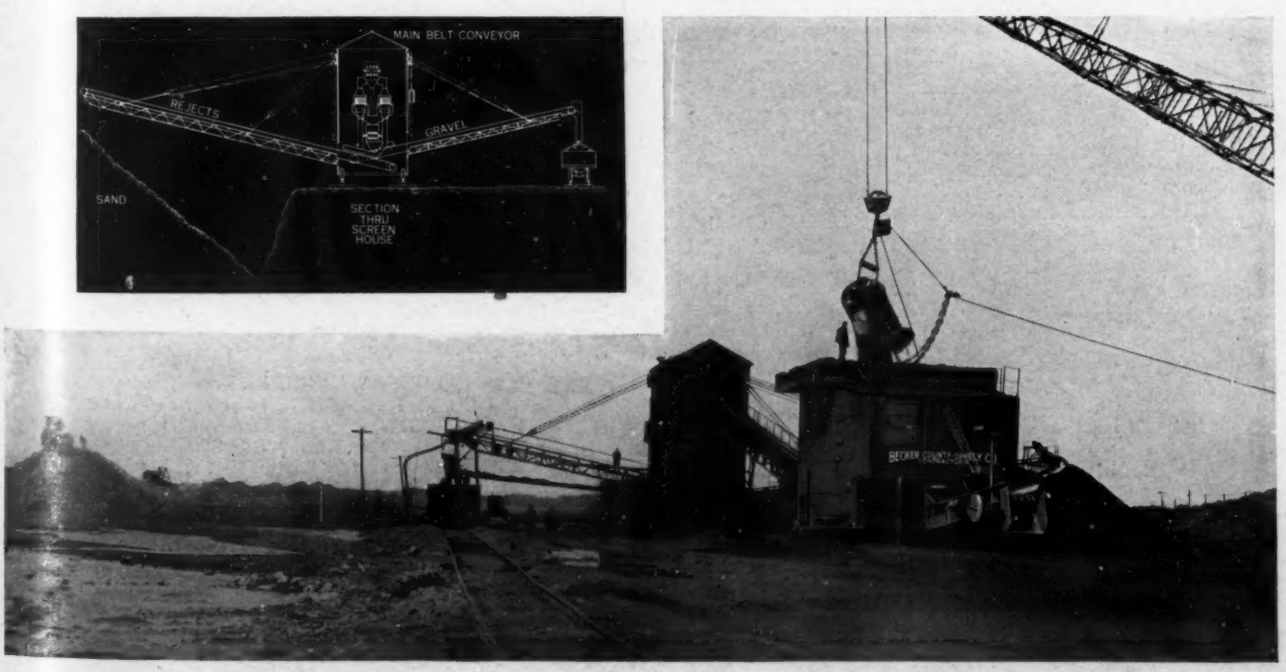

LINK-BELT HANDLING PREPARATION EQUIPMENT

Rock Products

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April, 1936

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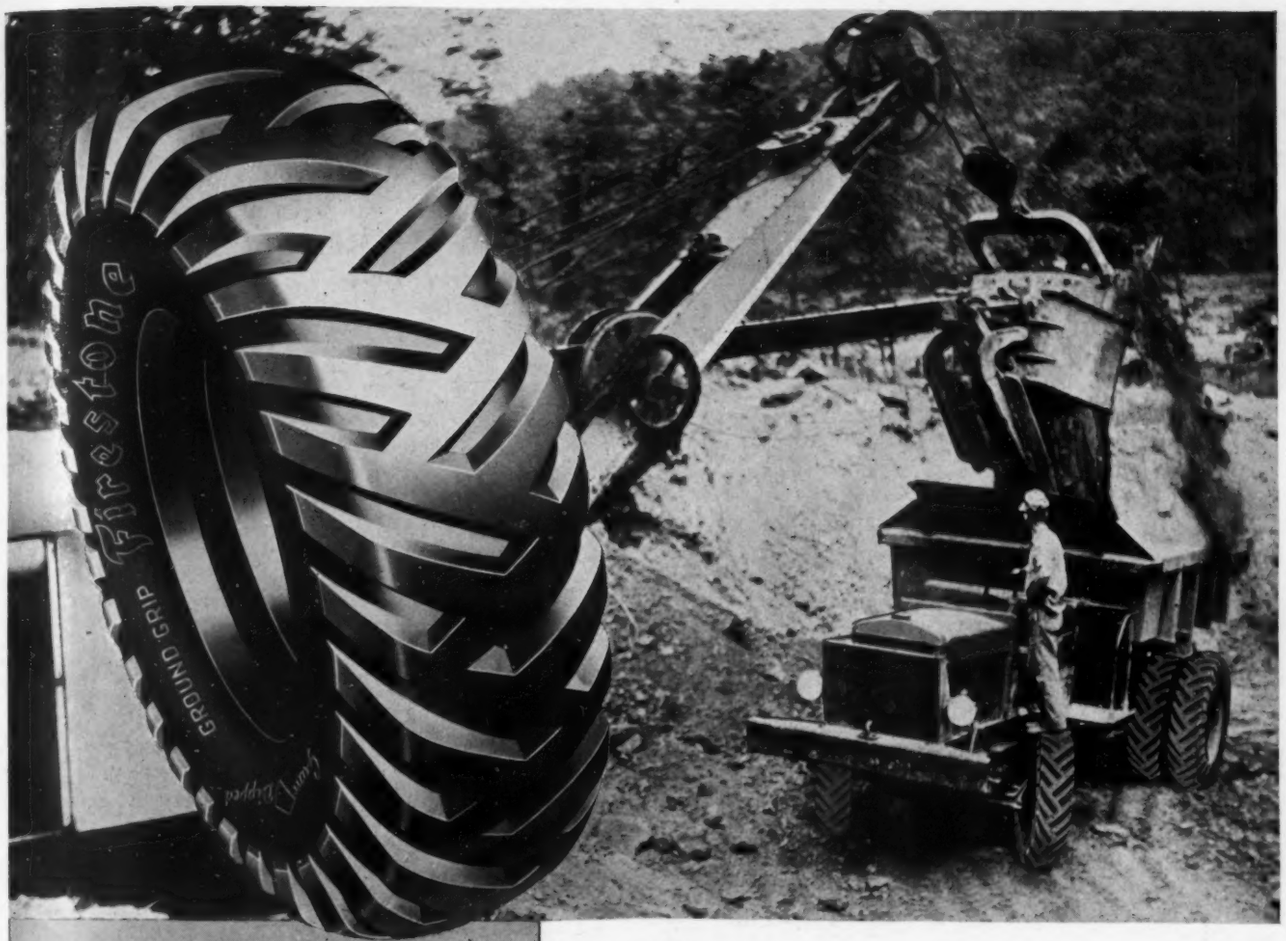

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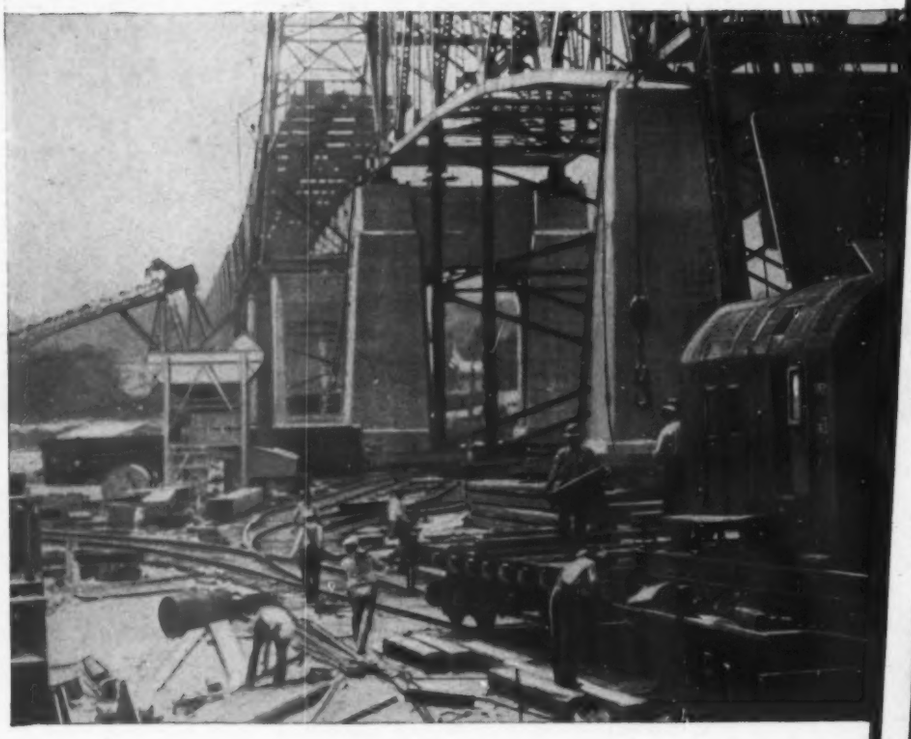

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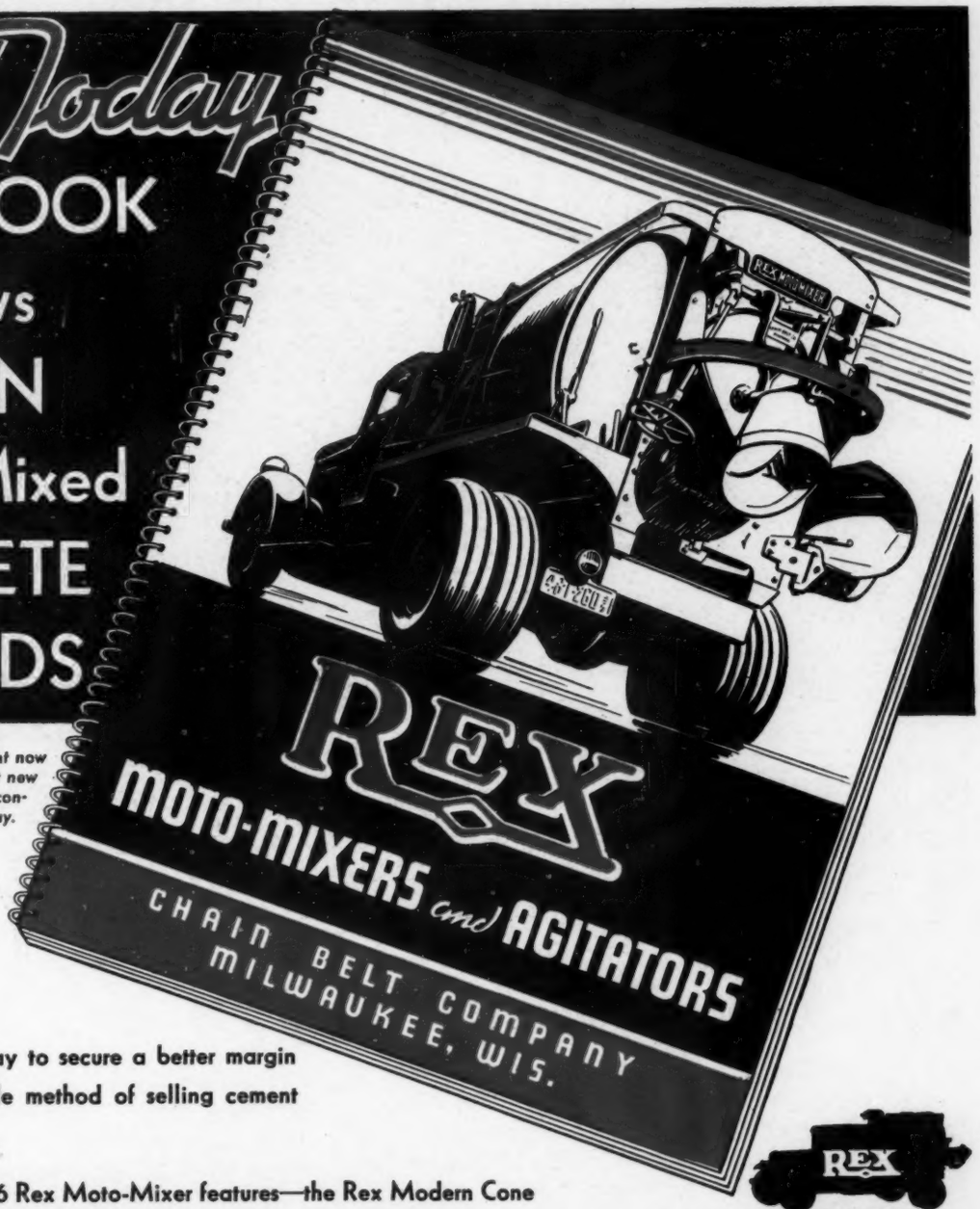

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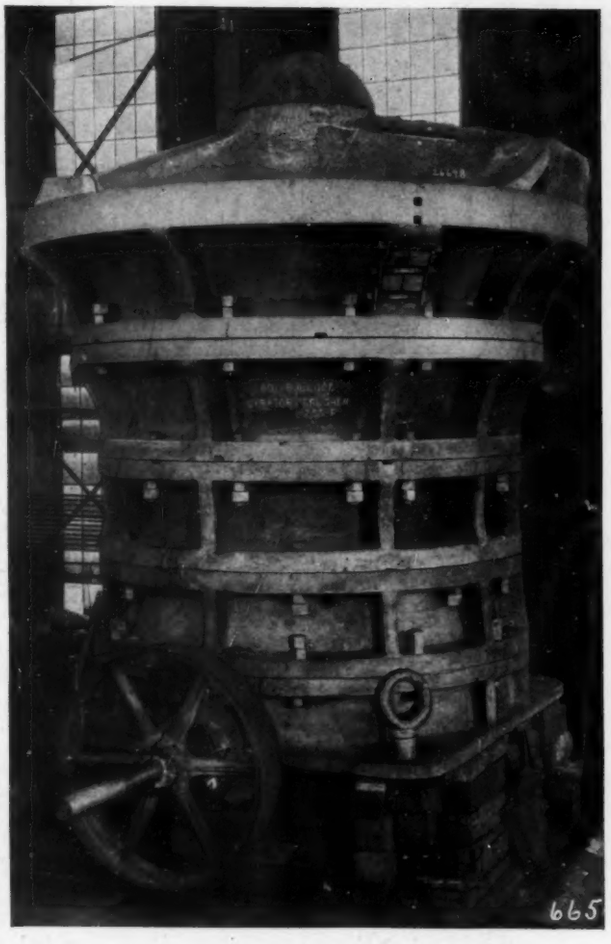

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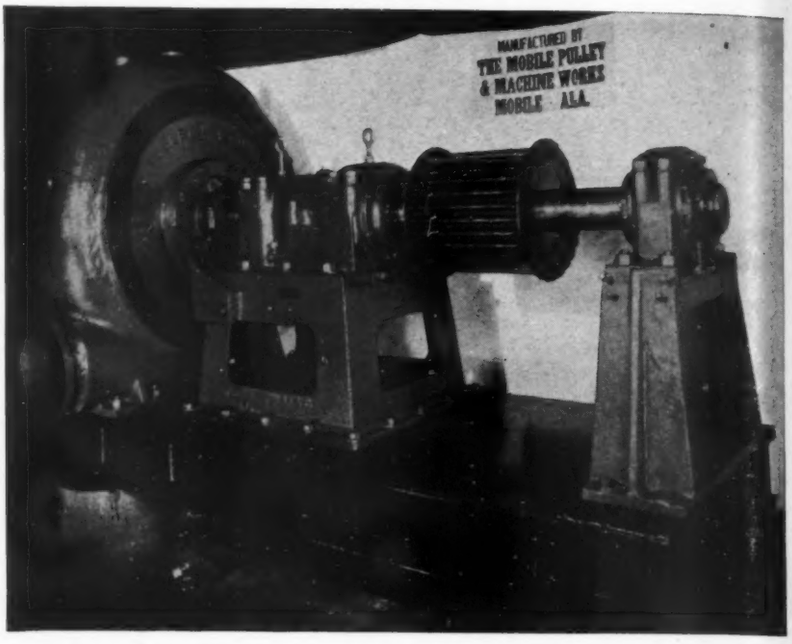

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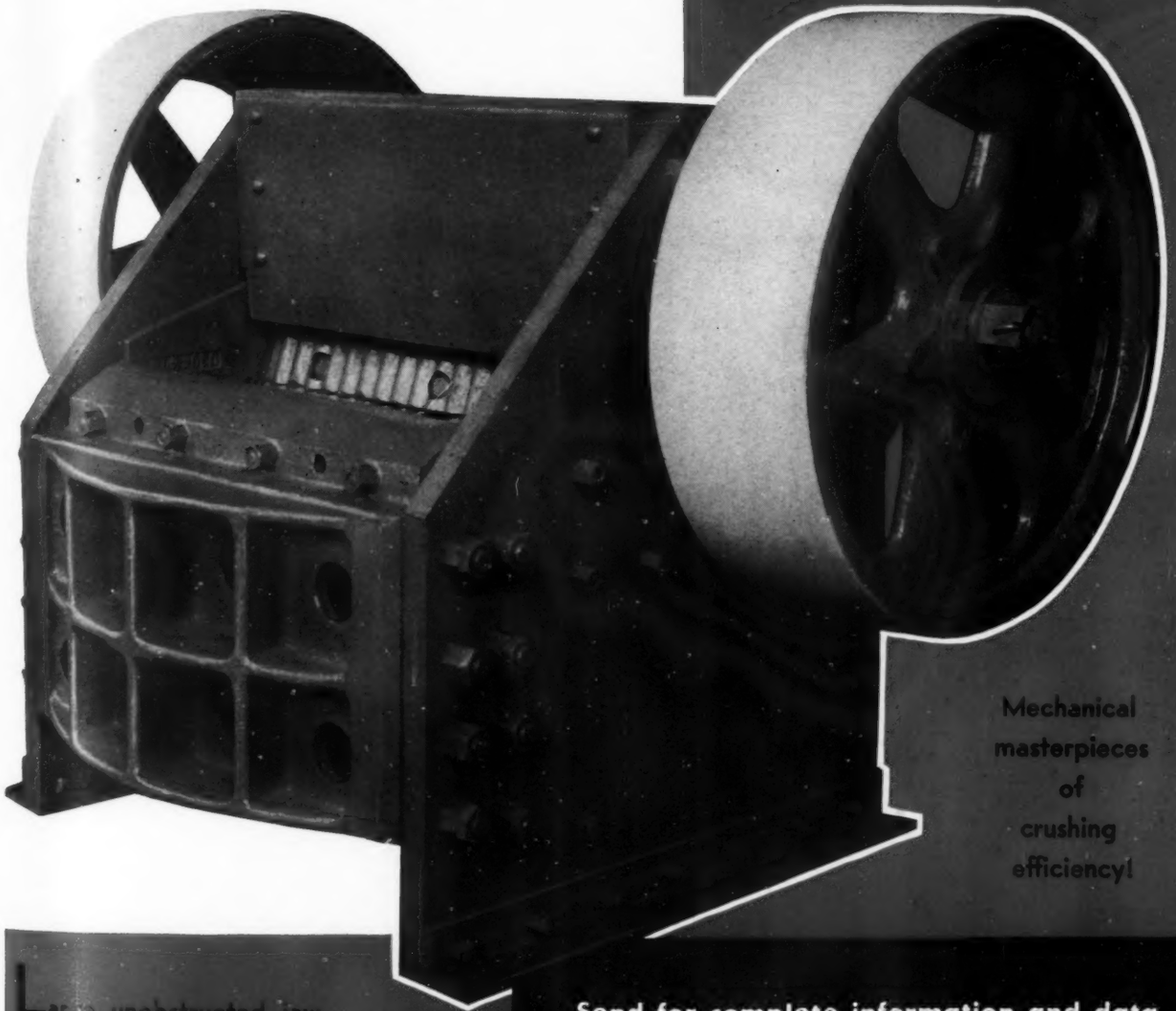

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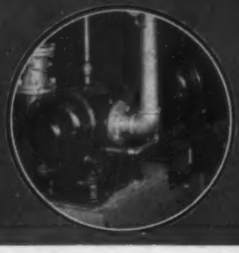

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IF IT IS SAND, GRAVEL OR STONE

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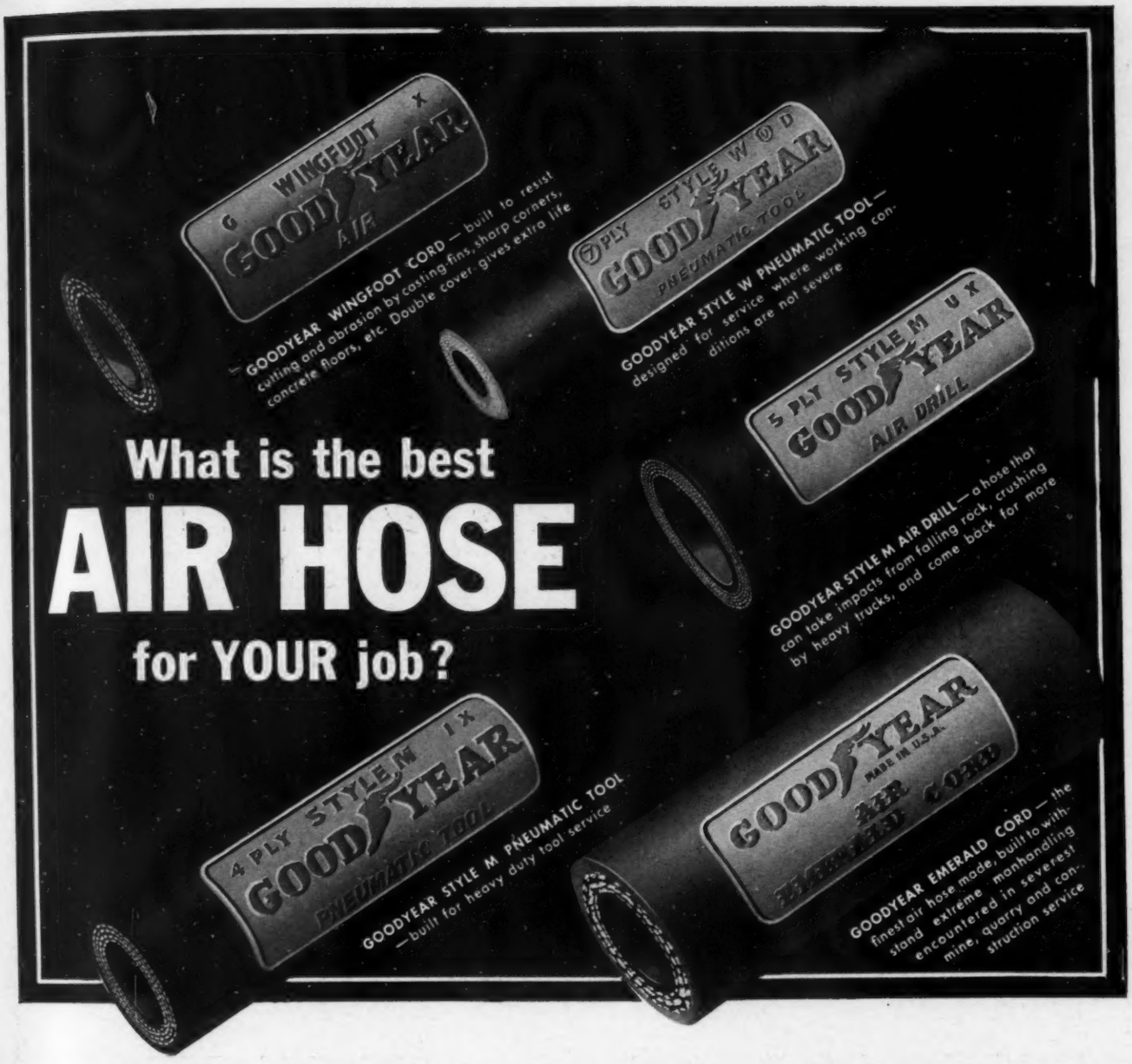
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GOODYEAR STYLE W PNEUMATIC TOOL — designed for service where working conditions are not severe
GOODYEAR STYLE M AIR DRILL — a hose that can take impacts from falling rock, crushing by heavy trucks, and come back for more
GOODYEAR STYLE M PNEUMATIC TOOL — built for heavy duty tool service
GOODYEAR EMERALD CORD — the finest air hose made, built to withstand extreme manhandling encountered in severest mine, quarry and construction service

NATURALLY, that depends upon the job, for some are far more "hardboiled" than others. That is why Goodyear builds five different types of air hose to meet specific requirements of various services—a quality line that time has proved outstanding in withstanding the three chief enemies of hose life: *light, oil* and *pressure.*

Sunlight slowly oxidizes hose, causing it to crack like an old rubber band. To offset this, all Goodyear Hose has an exclusive, light-impervious, *"anti-ox"* compound cover that prevents premature checking.

To combat the rotting action of oil in the line Goodyear has developed a special non-porous, slow-aging, non-swelling tube stock that eliminates all danger of tube flaking off and clogging tools.

And all Goodyear Hose has a high-tensile carcass, woven in a way that holds pulsing pressures with iron-pipe surety, yet gives extreme flexibility in short-radius work and absorbs dragging "tow rope" strains.

Specified by GTM

No wonder Goodyear Air Hose is recommended by all industry for its remarkable low-cost service. Why not consult that experienced hose expert the G.T.M. — Goodyear Technical Man. He'll gladly advise you which Goodyear Hose is best for your job. To bring him write Goodyear, Akron, Ohio, or Los Angeles, California— or the nearest Goodyear Mechanical Rubber Goods Distributor.

BELTS • MOLDED GOODS
HOSE • PACKING
Made by the makers of Goodyear Tires

THE GREATEST NAME IN RUBBER
GOODYEAR

Do You Know—

That next to a new PLYMOUTH Gasoline Locomotive your best bet is a FACTORY-REBUILT, FACTORY-GUARANTEED

PLYMOUTH?

BUY IT WITH CONFIDENCE - - - - YOU ARE PROTECTED
GIVE US YOUR REQUIREMENTS

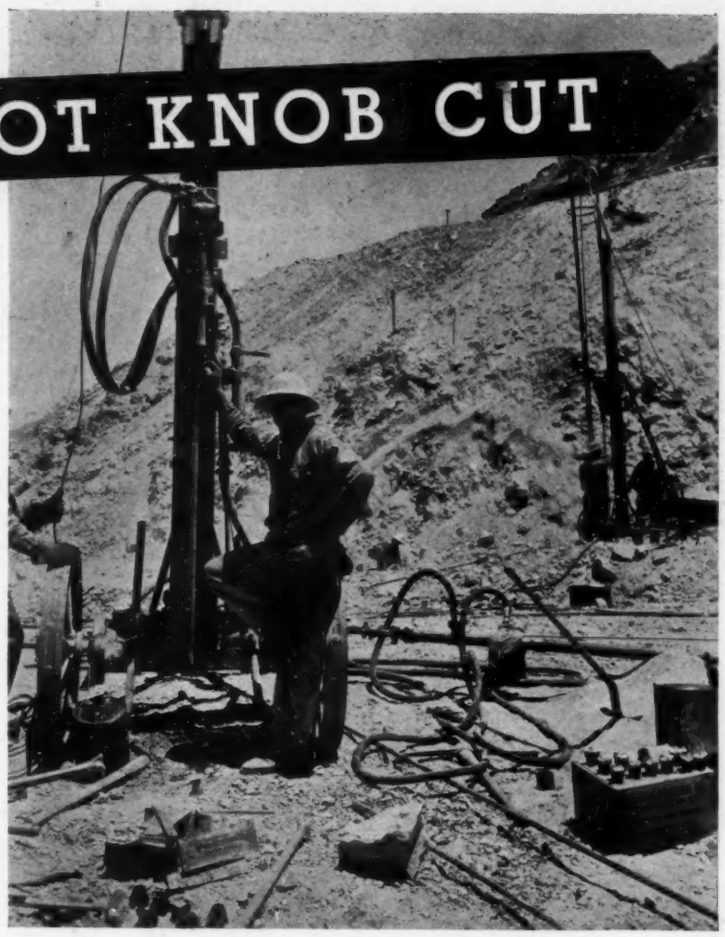
GASOLINE
PLYMOUTH
LOCOMOTIVES
DIESEL

PLYMOUTH LOCOMOTIVE WORKS

(Division of The Fate-Root-Heath Co.)

PLYMOUTH, OHIO

IN THE PILOT KNOB CUT



• Two WDA-10 Rigs were used for the primary drilling operation on Griffith's 570,000-yard cut of the All American Canal. In the hard, ravelly ground of the Pilot Knob Cut, the Cleveland Rigs were the only machines that would turn the trick. Some of the hard streaks were so difficult that more than a dozen bits would be required to drill a single foot of hole. Yet the Cleveland Rigs each averaged 150 feet of holes per day. Ordinary wagon drills could not do the work and were soon removed from the job.

• You will want to know how a Cleveland Rig will save money on your own drilling job. Bulletin 109 tells the story.

•

Beside Drill Rigs, or wagon drills, we manufacture

Hand Hammer Drills	Hose Couplings
Sinkers, Drifters, Stopers	Air Valves
Paving Breakers	Drill Steel
Pneumatic Diggers and Tampers	Paving Breaker Steels
Tripods, Columns	Miscellaneous

Air Tools and Accessories

Did you get a copy of the "Driller's Handbook"? It will be mailed free to bona fide rock drill owners and operators in return for the Coupon filled out with the types and sizes of drills you are using.

THE CLEVELAND ROCK DRILL CO.

3734 EAST 78th STREET, CLEVELAND, OHIO

LEADERS IN DRILLING EQUIPMENT

THE CLEVELAND ROCK DRILL COMPANY
3734 East 78th Street, Cleveland, Ohio
Gentlemen:—Please send me the "Driller's Handbook."

Name .....
Company .....
Address .....
We are now using the following makes and types of machines:
Hand Hammer Drills.....
Paving Breakers .....
Clay Diggers .....
Back Fill Tampers .....
Wagon Drills .....

BUCYRUS-MONIGHAN

can safely work close to the edge of a bank. It rests on its circular base when digging . . . not on its extending traction treads . . . ready to step away at an instant's notice. The ground bearing pressure is lower than that of any other dragline. Manufactured by Bucyrus-Monighan, Chicago, Illinois.

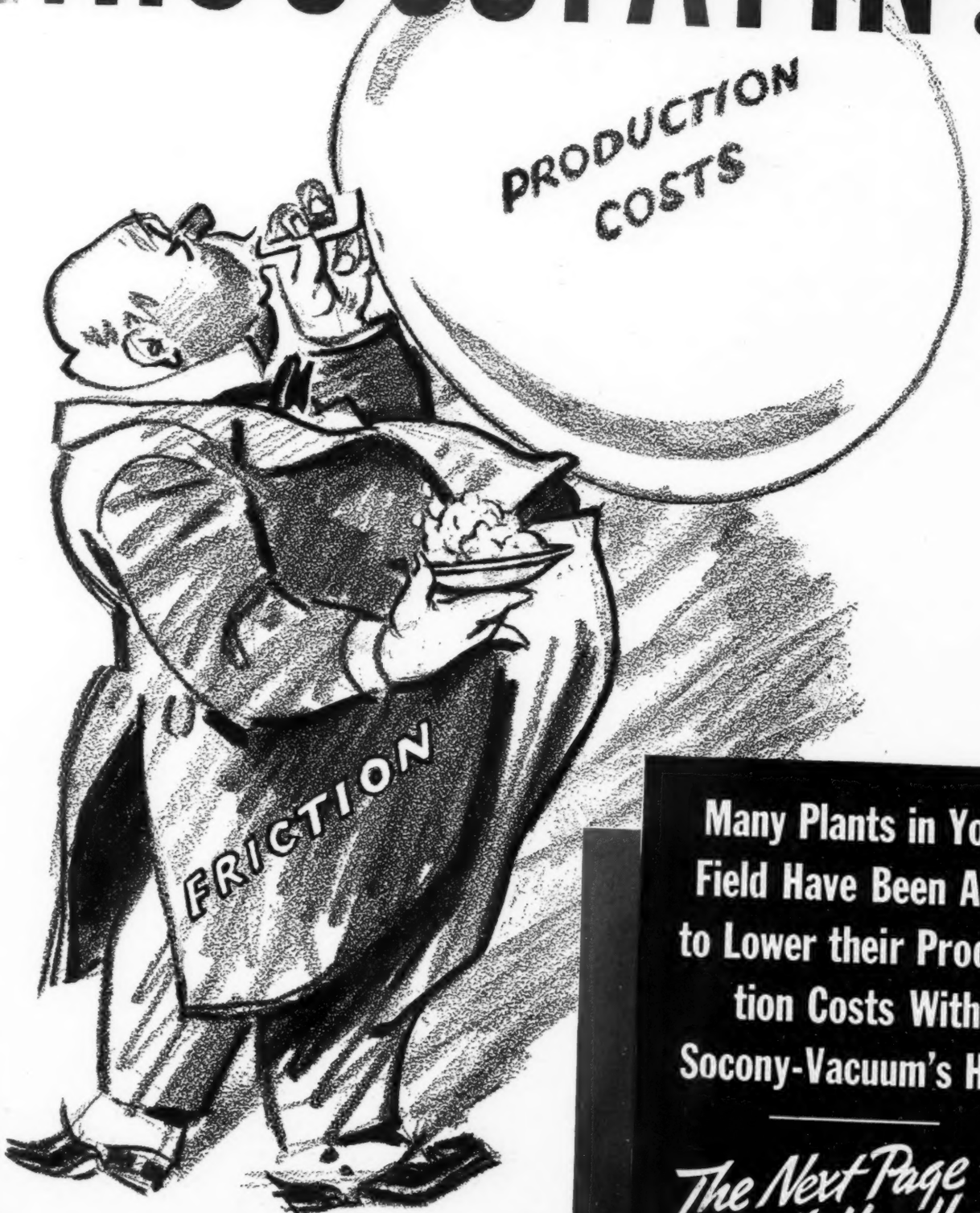
Illustrated: Gravel pit operations on one of Winston Brothers Company jobs in Idaho.

BUCYRUS MONIGHAN

Sold by BUCYRUS-ERIE CO.
SOUTH MILWAUKEE, WISCONSIN, U.S.A.

1056

WHO'S GOT A PIN?



Many Plants in Your Field Have Been Able to Lower their Production Costs With Socony-Vacuum's Help

The Next Page Tells You How—

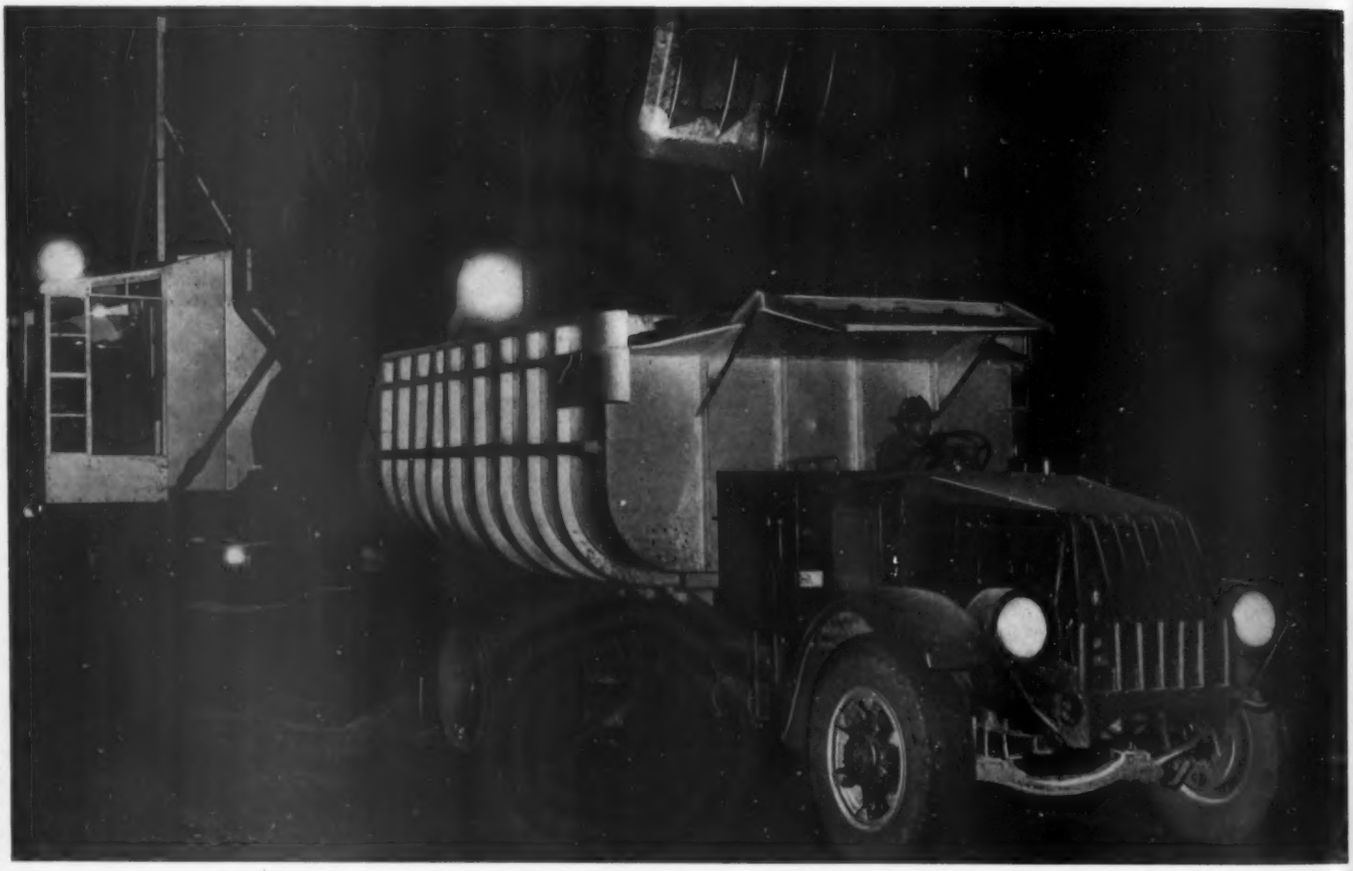
much mo… years. Stud… are beginning to realize that temperature, humidity, pressure and cleanliness do not tell the whole

…abandonment of the more …t course to restrict investment to short-term paper. The government, municipalities and corporations of strong position have it all their own way, to borrow money cheaply for long terms.

…so long a… overbalances … ment securities. … …ities point out. There is no inclination to return to an attitude that prevailed earlier in the depression, which was to sit on cash assets and ignore the

"We are convinced that close dependence in uniting nations of the modern world will facilitate the return of prosperity the same as it hastened the development of the crisis," he concluded.

TIME SAVED BEFORE THE JOB BEGINS!



Thousands of Contractors Do It by Standardizing on Socony-Vacuum Products

CONTRACTORS find a way to "sharpen their pencils." For Socony-Vacuum Products help them figure close.

These lubricants protect against equipment failure. They reduce costs by actually saving time before the job begins! They make units work better, faster, cheaper!

For every part, from cables to journals, there are special Socony-Vacuum oils and greases. These were developed from years of experience in scientific lubrication methods.

Thousands of contractors use this experience . . . seek the advice of Socony-Vacuum Engineering Service. They find it profitable to have these engineers work with their men . . . help them devise profitable economies.

The calls involved in refundings have withdrawn bonds from many private sources and, in cases where direct exc… have not been afford… holdings …

Trend Toward Concentration.

An accumulating result of this phase of refunding operations has been that … of ma…

…tions to put part of their idle funds to work, but it has done little to reduce the aggregate of idle capital.

There has been an even more di… …n that direction in the …

Cites Recovery Signs.

He pointed to improvement in agriculture, industrial production, and the ind… French prices a…

SOCONY-VACUUM OIL CO.
INCORPORATED

STANDARD OIL OF NEW YORK DIVISION · WHITE STAR DIVISION · LUBRITE DIVISION · WHITE EAGLE DIVISION
WADHAMS OIL COMPANY · MAGNOLIA PETROLEUM COMPANY · GENERAL PETROLEUM CORPORATION OF CALIFORNIA

GARGOYLE
Lubricants

FROM BURMA, THE YUKON OR THE ANTIPODES...

TISCO SERVICE For Mines, Quarries & Cement Plants

- **Manganese and Alloy Steel Wearing Parts**
- **Dredge Buckets** *(riveted and rivetless types)*
- **Power Shovel Parts**
- **Dippers, Dipper Teeth**
- **Pulverizer and Crusher Parts**
- **Pump Parts**
- **Manganese Screens and Screen Cloth**
- **Grinding Balls**
- **Welding Rod, etc.**

From the remote corners of the world—from the placer operations in Burma, New Guinea, Sumatra and the Antipodes . . . from the lode mines of South Africa, Chile, Siberia and the Philippines — wherever there are mining or quarrying operations here or abroad . . . engineers write TISCO in their specifications for wearing parts. Industry seeks out the supply source—regardless of distance—which furnishes a product that gives longer wear, better operating efficiency, and lower costs. Industry, everywhere, comes to TISCO for repair parts.

TAYLOR-WHARTON IRON AND STEEL COMPANY

HIGH BRIDGE, NEW JERSEY

PLANTS AT HIGH BRIDGE, N. J.—EASTON, PA.

Offices:

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Montreal, Quebec — London, England — Penang, F.M.S. Also represented at The Hague and Dutch East Indies.

Modern science of blending soils opens new field to AGGREGATE PRODUCERS

MANY a gravel pit, quarry and brickyard is going to pour out ready-mixed, ready-to-apply stabilized road surfacing. Nineteen thirty-six is the year for building secondary roads, and stabilized mix is the material most needed.

Soil scientists have discovered, and highway engineers have applied to road building, the properties of cohesion, friction, endurance, and firmness. Certain soils possess and retain their desirable properties when mixed with moisture regulating Calcium Chloride and provide a stabilized road at very low cost.

Fortunately, most of the needed soils are available in or near regular pits and quarries. Much of the bulk consists of overburden soils and finer aggregates, often unsalable in commercial work except as "fill" dirt. Much of the equipment necessary for testing, grading, proportioning and mixing is already in the pits and quarries.

So it costs aggregate producers very little to get into this profitable business of supplying "stabilized soil mix." Bulletin number 24 tells how. Write for it today.

Above—A typical Michigan stabilized road.

Left—Pit operations using clay overburden, at New Hudson, Michigan.

Below—Sandwich Fairgrounds stabilized road, De Kalb County, Ill.

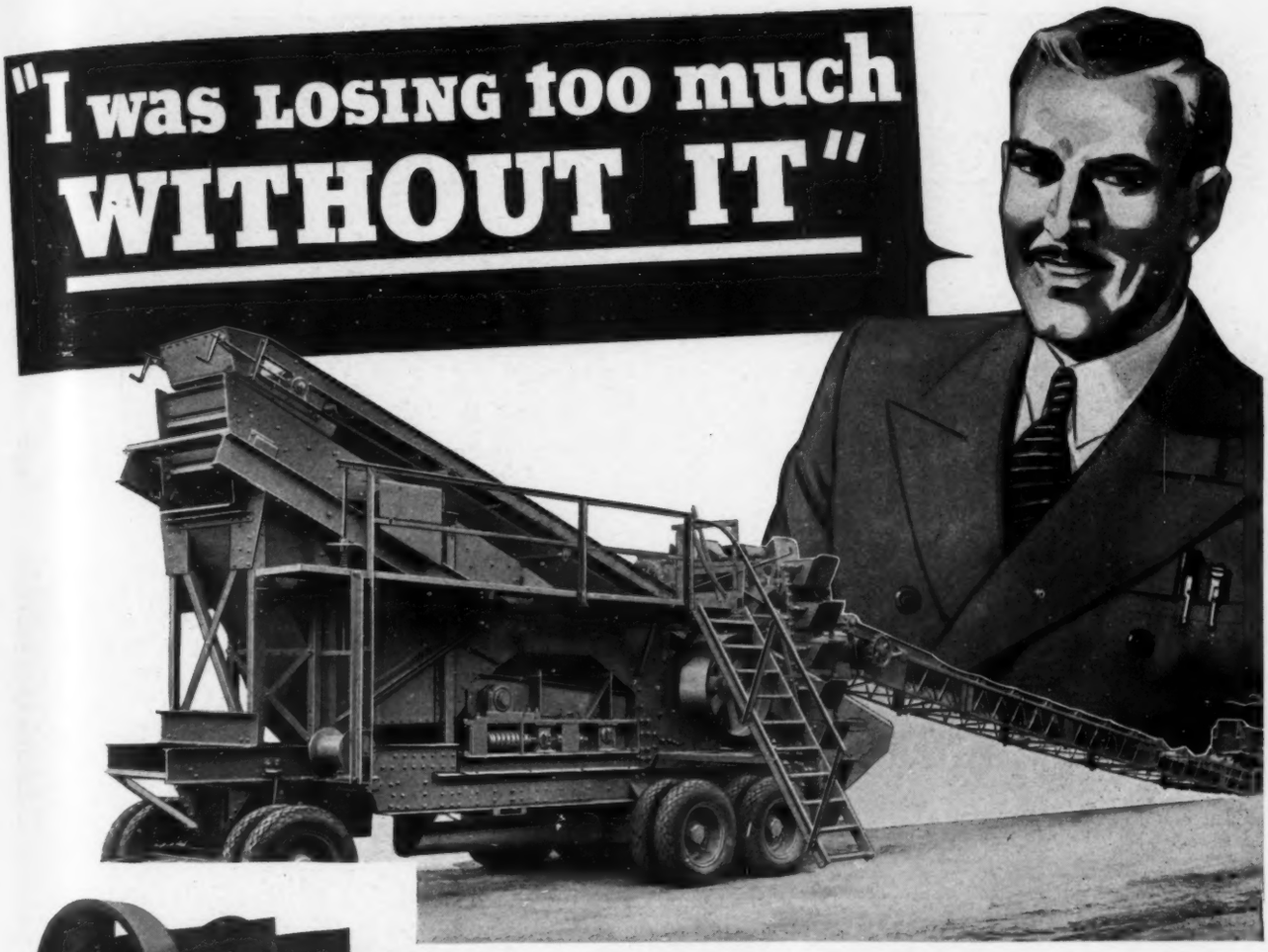
Calcium Chloride Association

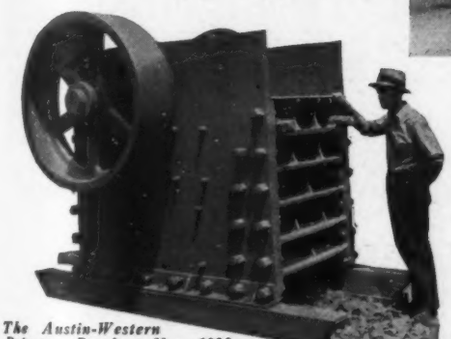
Michigan Alkali Company, 60 E. 42nd St., New York City
Solvay Sales Corporation, 40 Rector St., New York City
The Columbia Alkali Corporation · Barberton, Ohio
The Dow Chemical Company Midland, Michigan

CALCIUM CHLORIDE

FOR STABILIZING ROAD SURFACES

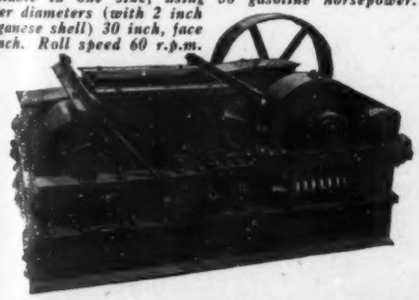
"I was LOSING too much WITHOUT IT"





The Austin-Western Primary Breaker No. 1838. This jaw-type crusher gives you large capacity at low cost per yard. With best roller bearings available, it operates at full capacity without bearing or shaft troubles.

The Austin-Western Roll Crusher No. 3018 Available in one size, using 50 gasoline horsepower. Roller diameters (with 2 inch manganese shell) 30 inch, face 18 inch. Roll speed 60 r.p.m.



Austin-Western Crushing & Screening Plants Let You

meet all competition

Progressive fixed plant producers are buying Austin-Western Portables. They are being awarded business at a profit where haulage costs formerly shut them out.

A Portable is good insurance. It lets you diversify. It protects you from the loss of a contract. It keeps you in the bidding—enlarges your market.

The Number 100 Portable Plant has a 9 by 40 inch primary roller bearing jaw crusher and an 18 by 38 inch roll (or 4 by 40 inch jaw) crusher for reduction crushing.

All portable plants have oversize shafts and roller bearings throughout. They are built to meet the growing demand for smaller sizes of stone now so generally used for road construction.

Compact for easy transport on steel or pneumatic tired wheels, they can be set up for operation in a few hours.

THE AUSTIN-WESTERN ROAD MACHINERY CO.
Aurora, Illinois

Austin-Western

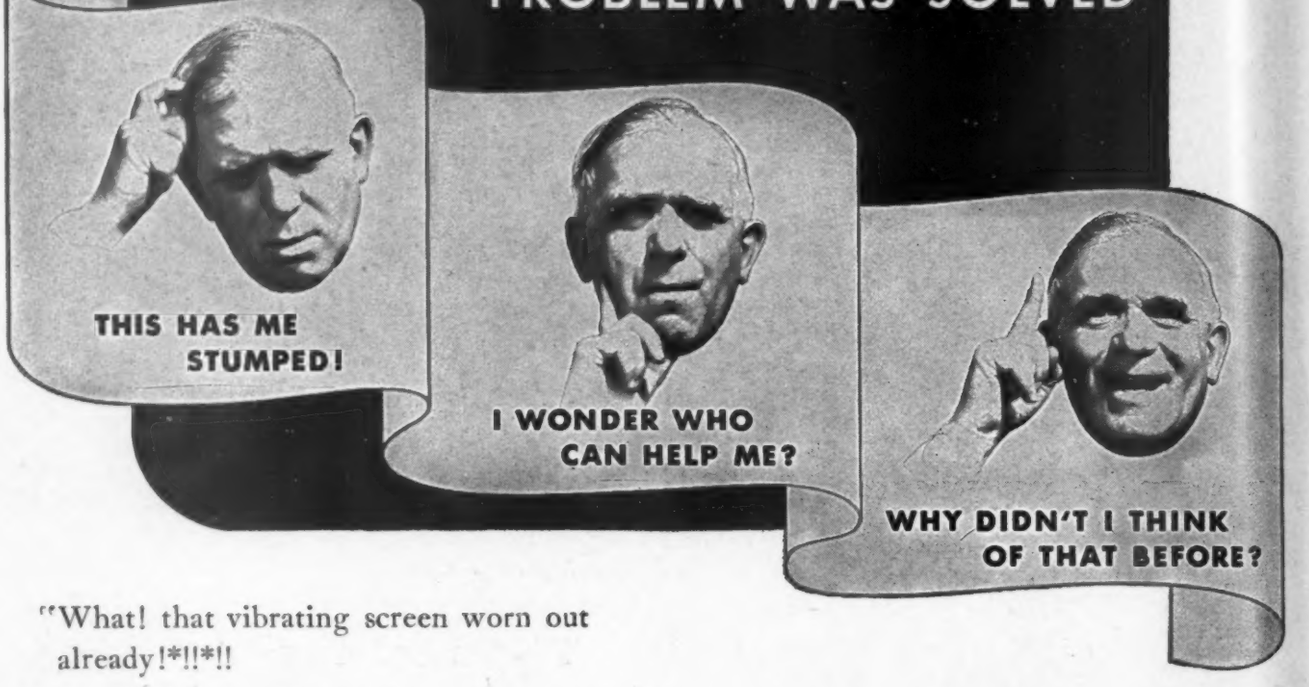
The Austin-Western Road Machinery Co.
V, Aurora, Ill.
Please send details on.....
Name.....
Address .....
City.....State.....

ROAD GRADERS · MOTOR GRADERS · ELEVATING GRADERS · DRAGS
ROAD ROLLERS · DUMP WAGONS · DUMP CARS
SCARIFIERS · BULLDOZERS · TRAILERS · SCRAPERS · PLOWS
BITUMINOUS DISTRIBUTORS · ROAD-MIX MACHINES · CULVERTS
CRUSHING AND WASHING PLANTS · SWEEPERS AND SPRINKLERS · SHOVELS · CRANES · ETC · SNOW PLOWS

A Movie

TITLE

HOW A WIRE SCREENING PROBLEM WAS SOLVED



"What! that vibrating screen worn out already!*!!*!!

"I've fooled around with this screen wear problem long enough...

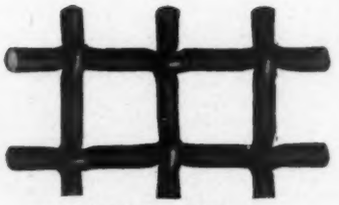
"But what'll I do?

"By Golly, I have it...I'll settle this thing quick!

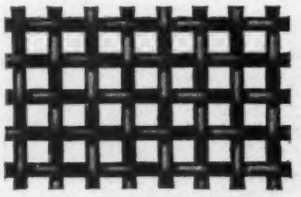
"Here, Miss Smith...take this letter to Roebling, the wire screen people...

"If anybody can lick this problem they can, with their 90 years of wire making experience."

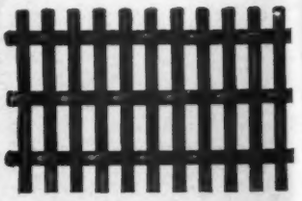
JOHN A. ROEBLING'S SONS COMPANY
TRENTON, N.J. *Branches in Principal Cities*



"HY-LO" Crimp Wire Screen



Square Mesh Wire Screen



Oblong Mesh Wire Screen

ROEBLING *Wire Screen*

TRADE JERSEY MARK

90 YEARS OF WIRE MAKING SPELLS THE DIFFERENCE

MODERNIZE

● *One of a fleet of 7 Model "87Q" Hugs equipped with a 7-yard barrel type body of special Hug construction, built for the Georgia Limerock Co., Perry, Ga.*

WITH HUGS

● 1936 is a year for modernization—in methods and in equipment. Start your modernization program with your transportation equipment by putting Hugs on the job. Moving rock products with Hugs gives you greater mobility and flexibility—at lower cost per yard. You'll see the results in faster hauling of bigger pay loads and at less expense per mile.

Fast, low-cost moving of quarry and rock products on tough jobs calls for equipment specially built to meet the conditions. Ordinary dump trucks just won't do. You must have trucks with real guts—trucks that will come through every time, no matter how tough the conditions, and then race back for more.

Hugs have everything! They are especially built to meet and withstand the toughest conditions; they have the ruggedness needed for rock and dirt moving operations. Hugs stay on the job year after year!

Tell us about your transportation needs. Let our engineers study your individual requirements and recommend specially designed and built Hug equipment.

HUG

THE HUG COMPANY
558 Cypress Street • Highland, Illinois

BUILT TO MEET A CONDITION

LORAINS—2 yd. to 3/8 yd.—Move More Material, Faster, at Less Cost

1 1/2 YD. DIESEL LORAIN-77
Moves 10-20% more material at 50-80% less fuel cost.

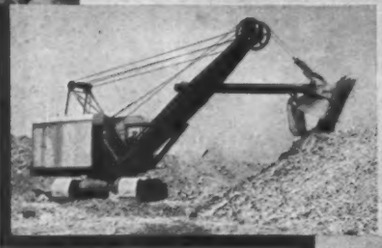
CENTER DRIVE isn't just an emblem that identifies all Lorains—rather, it stands for the basic design and the convincing shovel and crane performance of Lorains of all capacities.

Watch a Lorain and you'll soon know what Center Drive means—a short cut from motor to smooth, powerful operations; a shovel boom that reaches higher up, farther out; a 2 speed crawler, simple, powerful, agile.

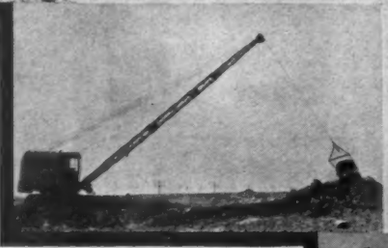
Check on any Lorain from the 2 yd. L-87 to the 3/8 yd. L-27—and you'll find a performance record which proves that —*"CENTER DRIVE is the Greatest Specification a Shovel or Crane can have."*

LORAIN-95
A big capacity, long range dragline, clamshell, crane on a crawler 18 ft. long.

2 YD. LORAIN-87
A heavy duty 2 yd. unit equipped with the newest idea in shovel booms.



3/4 YD. LORAIN-40
Capacities by Stability and Strength, not Weight. Honest 3/4 yd. dipper and real ranges at 33,000 lbs. weight. Also 5/8, 1/2, 3/8 yd. models. Single purpose trailers for all.



THEW CENTER DRIVE

TRUCK CRANES & SHOVELS
Crane and shovel earning ability combined with high speed truck mobility. 3/8 to 3/4 yd. capacities.

THE UNIVERSAL CRANE COMPANY • LORAIN, OHIO
THE THEW SHOVEL COMPANY • LORAIN, OHIO

LAY·SET *Preformed*

works longer and harder

At this Indiana operation the construction company found the shaly overburden hard on the wire rope. So they bought LAY-SET Preformed.

As an example of LAY-SET service:—on the Paige dragline (shown on the second level) LAY-SET Preformed gave 384 working hours of service—as against the nearest competitive rope performance of 244 hours.

• • •

This report of increased service is typical of LAY-SET Preformed performance. We have scores of similar service reports in our files from practically every industry. If you are looking for longer service, specify LAY-SET Preformed.

HAZARD WIRE ROPE COMPANY, Inc.
Wilkes-Barre, Pennsylvania

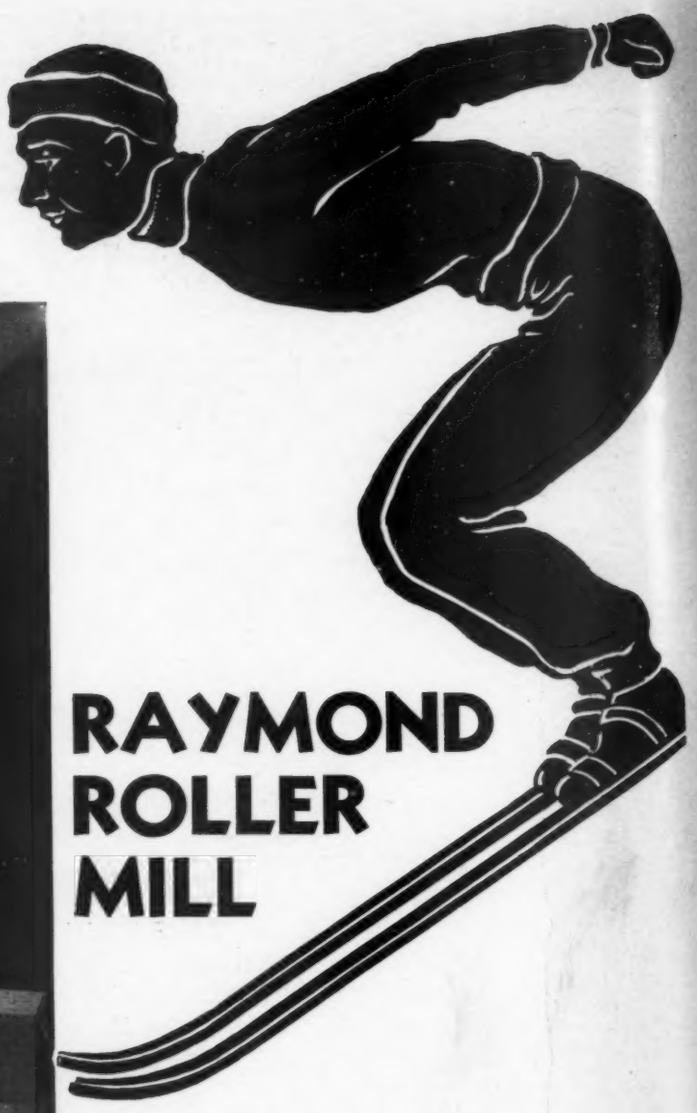
IN BUSINESS FOR YOUR SAFETY

An Associate Company of the American Chain Company, Inc.
District Offices: New York, Chicago, Philadelphia, Pittsburgh, Ft. Worth, Denver, San Francisco, Los Angeles, Birmingham, Tacoma

LAY-SET *Preformed* Wire Rope

ALL HAZARD WIRE ROPES MADE OF IMPROVED PLOW STEEL ARE IDENTIFIED BY THE GREEN STRAND

Still the Leader



RAYMOND ROLLER MILL

for
Finish Grinding
Fine Pulverizing
Coal Firing
Drying

They come and they go, but Raymond Mills remain the first in the field, setting the pace for industry in the production of powdered materials.

More installations operating—more industries served—more types of products handled—more mills sold year after year.

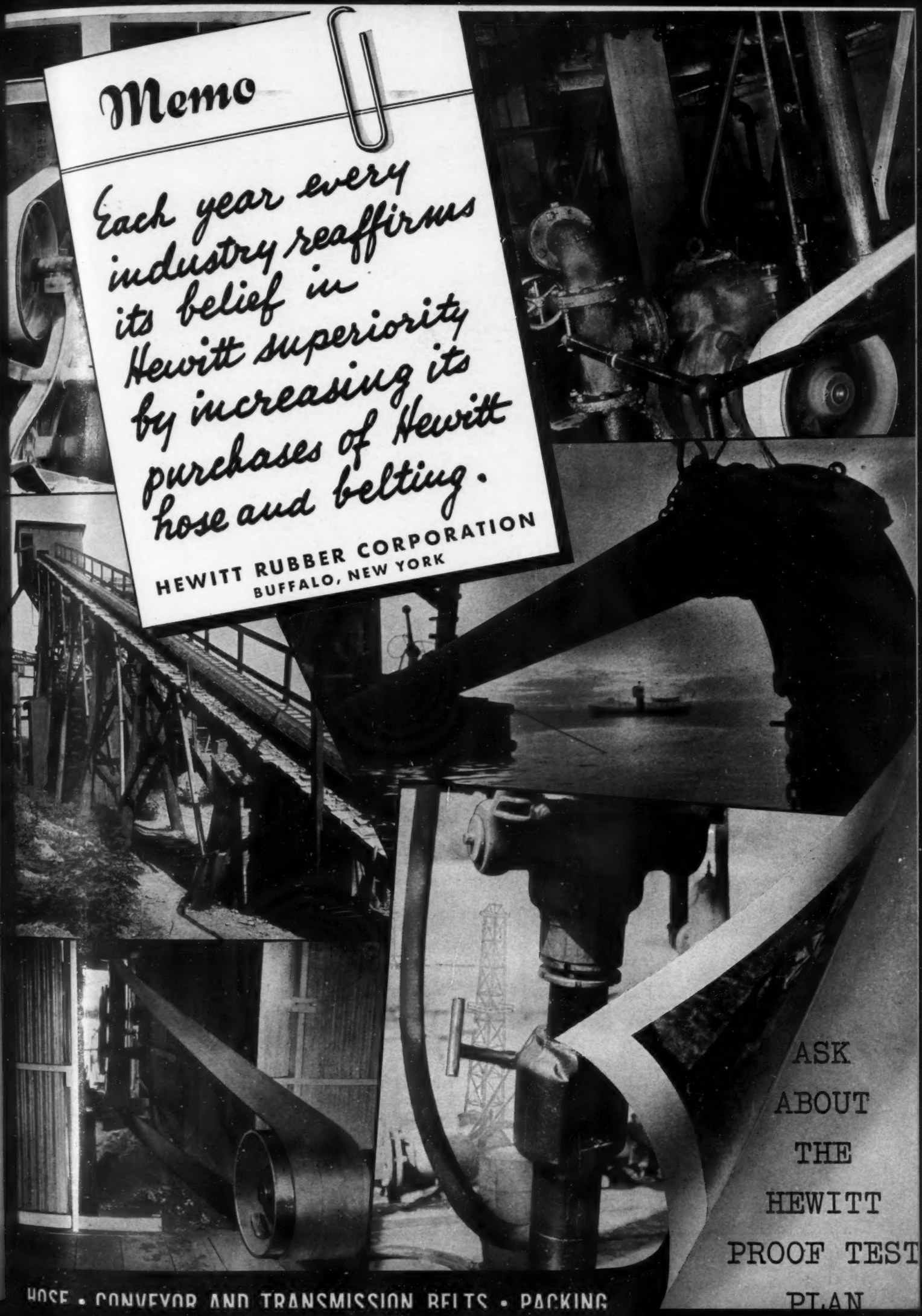
A wealth of experience, an alert engineering staff, and the resources to carry on constant development work—these are the things that make Raymond Mills a "yardstick of comparison" for production efficiency, operating control and power economy.

Specify Raymond for results.

Since 1887

RAYMOND BROS. IMPACT PULVERIZER COMPANY

DIVISION OF COMBUSTION ENGINEERING COMPANY, INC.
1307 North Branch Street CHICAGO
Sales Offices in All Principal Cities
Canadian Representative: Combustion Engineering Corporation, Ltd., Montreal


Memo
Each year every industry reaffirms its belief in Hewitt superiority by increasing its purchases of Hewitt hose and belting.
HEWITT RUBBER CORPORATION
BUFFALO, NEW YORK
ASK ABOUT THE HEWITT PROOF TEST PLAN
HOSE • CONVEYOR AND TRANSMISSION BELTS • PACKING

At the Colorado Portland Cement Company

FIRE!...

and 142 holes worked together

Teamwork, made possible by the use of Cordeau-Bickford Detonating Fuse, produced 160,000 tons of rock from a single shot. The Colorado Portland Cement Company, at Portland, Colorado, made this shot at their lime quarry using 8,780 feet of Cordeau. There were 142 holes in the blast, averaging 40 feet deep.

Teamwork always pays. When each cartridge *goes* with the force of a primer cartridge; when holes go in split-second rotation planned to relieve burden—then you have teamwork that produces more tonnage, better fragmentation. Add to these the advantages of simplified loading, less hazard, and large blasts vs. small ones, and you see why Cordeau-Bickford Detonating Fuse is so definitely a part of modern blasting technique.

Send for a copy of the Cordeau book.

CB-51

The ENSIGN-BICKFORD COMPANY, Simsbury, Connecticut

SAFETY FUSE Since 1836 • CORDEAU-BICKFORD DETONATING FUSE

KOEHRING

251

5/8 yard

Fast Operating Speeds — and light weight—two selective swing speeds and two travel speeds — only a few of the many outstanding operating features of the new Koehring 251.

Enclosed Gears — Anti-Friction Bearings — Heavy Duty Welded Construction—Koehring Chain Crowd, Positive Steering, Powerful Traction. The 251 is available as a Shovel, Crane, Dragline or Trench Hoe. Write for bulletin.

KOEHRING HEAVY DUTY

KOEHRING COMPANY

Pavers · Mixers · Shovels · Cranes · Draglines · Dumptors · Mud-Jacks

3026 WEST CONCORDIA AVENUE, MILWAUKEE, WISCONSIN

Accurately Sheared Sheets

Intricate parts are quickly flame cut from heavy plates.

Ryerson Abrasion Resisting Steel Sheets and Plates

Sheets and plates of a steel developed expressly for abrasion resistance. They last many times longer than ordinary steel yet are moderate in price. We can furnish them plain, or bent, perforated, punched or formed to your specifications. Write for bulletin giving complete data.

Perforated Sheets and Plates

We are prepared to furnish sheets and plates with all standard types of perforations. Two types are regularly carried in stock. See the Ryerson Stock List.

Other Steel Products

Ryerson stocks include practically everything in steel and allied lines.

Cold Finished Shafting
Beams and Heavy Structurals
Channels, Angles, Tees and Zees
Rails, Splices, Spikes, Bolts, Etc.
Plates—Sheets
Strip Steel, Flat Wire, Etc.
Stainless Steel
Hot Rolled Bars—Hoops and Bands
Extra Wide Cold Finished Flats
Alloy Steels—Tool Steels
Heat Treated Alloy Steel Bars
Boiler Tubes and Fittings
Welding Rod—Mechanical Tubing
Rivets, Bolts, Nuts, Washers, Etc.
Concrete Reinforcing Bars
Babbitt Metal and Solder

Write for Stock List

Steel in Stock for the Rock Products Industries

WHEN something breaks or when construction or extensions are necessary, you can depend on immediate shipment of the steel from a nearby Ryerson plant. More than 10,000 sizes and kinds of steel and allied products are carried in stock. If you desire it, experienced workers will quickly cut, bend, punch or form the material to your specifications.

There are ten Ryerson plants ready to serve you. When you need steel a phone call, wire or letter will start it on the way to you at once.

Joseph T. Ryerson & Son, Inc., Chicago, Milwaukee, St. Louis, Cleveland, Cincinnati, Detroit, Boston, Buffalo, Philadelphia, Jersey City

RYERSON

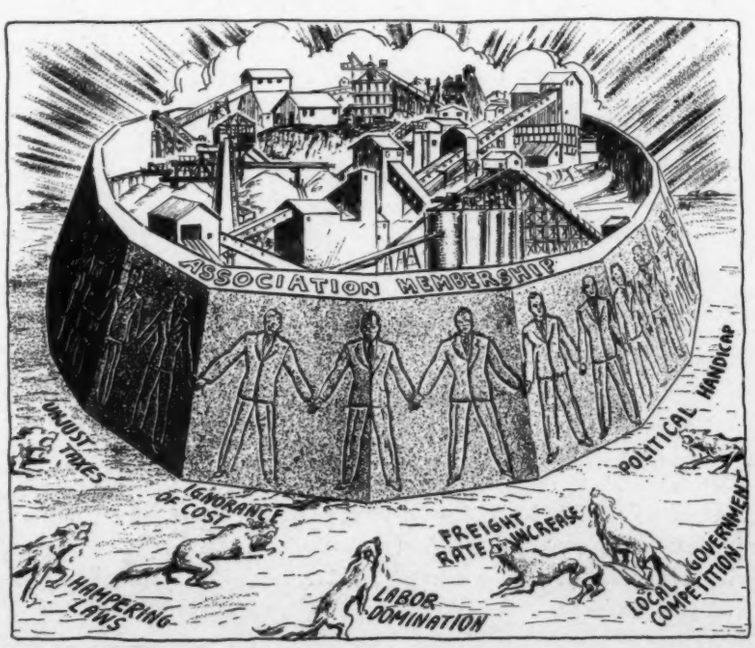
Rock Products
With which is Incorporated CEMENT and ENGINEERING NEWS Founded 1896

Volume XXXIX | Chicago, April, 1936 | Number 4

Be a Regular and Fight for Country and Industry

THE BLESSINGS of a free country—free anyway in the sense that we may here still pursue our vocations and our avocations according to our desires and talents and means—apparently, like the gentle rains from heaven, descend alike on the just and the unjust, or the deserving and the undeserving. We are apt to forget that those blessings were won by some of our forefathers at the expense of much individual suffering and sacrifice, and that they can be maintained only by continued individual sacrifice at least to the extent of some inconvenience and personal expense on the part of some of us.

Recently rereading Washington Irving's "Life of George Washington," it seemed remarkable that throughout the Revolutionary War which established our national freedom and our national character, there were seldom more than five or six thousand men in the *regular* Continental Army—often as few as two or three thousand, and during the winter at Valley Forge, less than that number. The Colonies had a population of about 3,000,000 with probably about 200,000 to 250,000 eligible males; some 10 per cent of these were in and out of the fighting ranks as militia on the call of the state governments, or often as suited their own whims, or their own convenience. Thus we owe the establishment of our American institutions to a relatively few patriots, who in the face of every discouragement would never say die, who maintained their organization even without money, food or clothes, who formed the nucleus, around which the others might rally when opportunity occurred, or when there was glory to be won, or actual home invaders to be repelled.



And this has been our national history ever since; a small band of practical patriots from generation to generation has kept alive and aloft the American character and the American ideals, while the rest have just gone along and accepted the blessings.

In that small band of practical patriots we would include the members of a majority of national trade associations. For, following the course of enlightened men in every line of constructive and creative human endeavor, they organized themselves into voluntary coöperative groups, and with their composite knowledge and experience sought to give a national character to American business and industry. Those efforts may often have been misdirected and misunderstood, but they were and are, nevertheless, essential to the retention of our conception of individual, economic and industrial freedom and security.

And now we have reached the lean years in the lives of some of these associations in the rock products industries just as we have reached the lean years in the lives of individuals. Their accomplishments of previous years seem to many to be withered by the more recent failure of the NRA code of these industries to lead to paths of prosperity and peace, if not to paths of glory. They are passing through the winter at Valley Forge. The small patriot army which has been fighting the battles of these industries these many years is still on guard, but it is stripped of the essentials needed for future campaigns. Deprived of the support indirectly resulting from the code authorities, with present membership dues based on the lowest tonnages in many years, the three national associations in

the mineral aggregates industries need to recruit new members and they need more financial and moral support from all the patriots in these industries.

We say patriots because a patriot is one who makes sacrifices for an ideal rather than for tangible benefits. National trade associations may be, of course, of demonstrable tangible benefit to their members in many, many instances, just as American citizenship is a tangible benefit, when one is in trouble, but the real virtue and the real benefit to be derived in supporting a national trade association is the maintenance of a patriot army to defend, and aggressively to fight for, the personal and the economic freedom that is enjoyed today in few if any other countries than our own.

We do not mean to insinuate that joining a national association of his industry is necessarily to fight for or against the New Deal, or any other economic or social plan put forward by political reformers, moral zealots or plain nincompoops—according to one's point of view; it means he joins to seek earnestly the wisdom and inspiration that will guide him, his industry and his country to a satisfactory solution of problems which it is hopeless for him to attempt to solve single-handed.

• • •

Mineral Aggregates Institute Dissolved

The Mineral Aggregates Institute was dissolved at a meeting of its board on March 13. This action, it is believed, was largely brought about by the financial stringency of the three supporting associations. Apparently, it became a matter of individual self-preservation before funds could be supplied for the institute. In the meantime, it is announced, the three associations will continue to act jointly on common problems.

No doubt there is a general belief that producers in each of the three branches of the mineral aggregates industry (for it is *one* industry) are best served by separate national associations which will ever keep the competitive angles alive, while single local associations including all branches are especially useful in meeting the so-called commercial or practical marketing problems. The three national associations supply inspiration, backbone and ammuntion; the one local joint association supplies a possible means of preventing cut-throat competition. The better armed local producers are through their membership in their national associations, the better fitted they are to cope with one another in a struggle for available business on a local coöperative basis!

That may be all very sound and logical from the wholly practical point of view, but it does not take in the larger angle which embraces national activities of a kind that would certainly have drawn the three groups closer together, had they been given free rein. For, as we have tried to make clear, the big task of all national trade associations is to uphold the American ideal of coöperative effort for finding solutions to economic and industrial problems. Practically all these problems are equally important to all three mineral aggregate industries. The one exception is the research and promotional problem, which in each individual case is both offensive and defensive; therefore it is most important in the eyes of all members of all three associations at the moment.

It is possible, of course, that in their present view of things the members of the three associations have put the cart before the horse; that instead of the three separate associations attempting to support what appears to them now to be excess baggage in the form of the Mineral Aggregates Institute, the institute should be supporting them as necessary but subsidiary branches of itself. Their present point of view is understandable and deserving of sympathy since the three associations are some twenty years old and the institute but a babe in arms.

Whatever the individual producer who is not now affiliated with any one of the associations may think about the present set-up, he should feel in duty bound to support the national association of his own industry. It is the only way provided by which he can join the patriot army of those who carry forward and onward the ideals of American industry.

We shall let the association managements and membership tell about the tangible advantages of joining up; we shall be satisfied if we can get producers to visualize their national trade association as a necessary part of our American institutions. Like all our American institutions, the national trade association will never be actively supported by *all* those who should support it; our national freedom in America was won and established and has been upheld by a comparatively small band of active patriots; the others have been mere hangers-on and spectators; but those today in the ranks of intelligent business men, and that should include all employers, in times like these, ought to be patriots rather than spectators.

• • •

Industry Wins in Congress

Both houses of Congress have passed the Agricultural Department appropriation bill with the regular $125,000,000 federal aid highway appropriation included. In doing this Congress acceded to the earnest solicitations of the entire highway building industry, including the state highway engineers, ignoring the request of the President that the regular federal aid appropriation be omitted, so that highway building might be included in boondoggling activities. In saving federal aid highways from the worst kind of local politics, and in obtaining recognition of the national obligation to continue such aid, regardless of the present emergency, the Mineral Aggregates Institute had an active part.

Since Congress is so frequently belabored in the public press and in private conversation for spineless acquiescence to every demand of the Chief Executive, we think you in the rock products industry ought to write your congressmen and tell 'em they did a good job in this instance. Probably they can stand a little praise. It's important in this case, too, because the newspapers, not understanding the significance of what Congress did to keep federal aid highway building out of local politics, condemn an apparent want of economy.

Aggregates Industry in New York Metropolitan Area

The United States Bureau of Mines has compiled the accompanying figures of production and shipments of crushed stone and sand and gravel in the New York Metropolitan area:

CRUSHED STONE SOLD OR USED BY PRODUCERS OPERATING IN THE NEW YORK METROPOLITAN AREA, 1924-34[1]

Year and territory	Concrete and road metal		Railroad ballast		Total	
	Short tons	Value	Short tons	Value	Short tons	Value
Hudson River:						
1924	[2]2,663,190	[2]$3,131,447	(2)	(2)	2,663,190	$3,131,447
1925	[2]3,552,030	[2]4,486,976	(2)	(2)	3,552,030	4,486,976
1926	3,867,930	4,983,254	343,340	$330,579	4,211,270	5,313,833
1927	[2]5,351,080	[2]7,936,732	(2)	(2)	5,351,080	7,936,732
1928	[2]5,694,970	[2]8,441,680	(2)	(2)	5,694,970	8,441,680
1929	[2]5,706,220	[2]8,548,329	(2)	(2)	5,706,220	8,548,329
1930	[2]5,609,720	[2]8,252,824	(2)	(2)	5,609,720	8,252,824
1931	[2]4,816,640	[2]6,473,837	(2)	(2)	4,816,640	6,473,837
1932	2,794,900	3,398,524	158,470	177,713	2,953,370	3,576,237
1933	1,960,420	1,380,857	174,000	172,697	2,134,420	1,553,554
1934	[2]2,347,320	[2]2,530,466	(2)	(2)	2,347,320	2,530,466
Northern New Jersey:						
1924	[2]1,302,200	[2]2,082,369	(2)	(2)	1,302,200	2,082,369
1925	1,325,350	2,150,390	139,920	177,423	1,465,270	2,327,813
1926	[2]1,486,190	[2]2,356,177	(2)	(2)	1,486,190	2,356,177
1927	1,474,870	2,396,738	183,940	254,310	1,658,810	2,651,048
1928	1,732,040	2,613,318	184,180	225,707	1,916,220	2,839,025
1929	1,718,930	2,600,978	112,800	134,174	1,831,730	2,735,152
1930	[2]1,811,900	[2]2,517,472	(2)	(2)	1,811,900	2,517,472
1931	1,426,190	1,796,559	42,070	46,963	1,468,260	1,843,522
1932	815,220	874,357	56,670	56,934	871,890	931,291
1933	563,710	600,248	29,070	26,210	592,780	626,458
1934	868,440	969,479	31,580	29,438	900,020	998,917
Western Connecticut:						
1924	[2]1,713,350	[2]1,833,724	(2)	(2)	1,713,350	1,833,724
1925	[2]1,685,380	[2]1,754,839	(2)	(2)	1,685,380	1,754,839
1926	[2]1,906,050	[2]2,062,599	(2)	(2)	1,906,050	2,062,599
1927	1,851,550	2,112,620	195,350	196,974	2,046,900	2,309,594
1928	[2]2,437,300	[2]2,872,195	(2)	(2)	2,437,300	2,872,195
1929	[2]2,375,390	[2]2,616,273	(2)	(2)	2,375,390	2,616,273
1930	2,010,300	2,087,154	239,960	240,429	2,250,260	2,327,583
1931	[2]1,858,650	[2]1,912,887	(2)	(2)	1,858,650	1,912,887
1932	[2]1,098,890	[2]968,889	(2)	(2)	1,098,890	968,889
1933	856,460	676,854	147,520	98,183	1,003,980	775,037
1934	994,930	1,056,778	83,540	63,987	1,078,470	1,120,765

[1]The companies included in the metropolitan area are as follows:

Hudson River: Callanan Road Improvement Co. (this company took over the operations of the Albany Crushed Stone Co. in 1929); Hudson River Stone Co. (1933 and 1934 only); New York Trap Rock Corp. (this company took over the operations of the Tomkins Cove Stone Co. in 1926); Suffern Stone Co. (this company took over the Suffern Quarry of the Belmont-Gurnee Stone Co. in 1930); West Nyack Trap Rock Co. (this company took over the West Nyack Quarry of the Belmont-Gurnee Stone Co. in 1930.

Northern New Jersey: J. W. Abel (out of business in 1928); Samuel Braen's Sons; Cliffside Trap Rock Co.; Consolidated Stone & Sand Co.; Gray Construction Co.—1934 only—quarry belongs to Somerset Crushing Co.; Fanwood Stone Co.; Great Notch Corp.; Estate of M. L. Kernan; Kingston Quarry Co.; P. Kramer; North Jersey Quarry Co.—in 1930 this company took over the operations of the Bound Brook Crushed Stone Co., Commonwealth Quarry Co., Interstate Crushed Stone Co., Morris County Crushed Stone Co., and Paterson Crushed Stone Co.; Orange Quarry Co.; Passaic County Quarry Co.—successor to Totowa Production Co. in 1933, who succeeded W. A. Ferguson's Sons, Inc., in 1931; Preen Crushed Stone, Sand, and Gravel Co.; Smalley Stone Co.; Somerset Crushing Co.—successor to Hoffman Construction Co. in 1930; Somerset Trap Rock Co.—successor to Wilson Stone Co. in 1930; Sowerbutt Brothers; Sowerbutt Quarries; Spottiswoode-Cusack Co. (1924 only); Standard Paving & Construction Co. (now out of business)—successor to Dyer-Kane Co. in 1931; Union Building and Construction Co.

Western Connecticut: Atlas Sand, Gravel & Stone Co.; Edward Balf Co.; C. W. Blakeslee; Connecticut Quarries Co. (this company took over the operations of the Connecticut Valley Traprock Co. in 1935); A. N. Farnham; Foxton Trap Rock Co.—successor to D. V. Frione & Co. in 1926; Hartford Sand & Stone Co.; New Haven Trap Rock Co.; Sherman Sand & Stone Co.; York Hill Trap Rock Quarry Co.

[2]Railroad ballast included under "Concrete and road metal."

METHOD OF TRANSPORTATION OF CRUSHED STONE IN THE NEW YORK METROPOLITAN AREA, 1932-34

	Railroad		Truck		Barge	
	Short tons	Per cent of total	Short tons	Per cent of total	Short tons	Per cent of total
Hudson River:						
1932	587,470	20	191,460	6	2,174,440	74
1933	196,970	9	457,070	22	1,480,380	69
1934	329,170	14	271,350	12	1,746,800	74
Northern New Jersey:						
1932	98,080	11	773,810	89	.....	..
1933	100,350	17	492,430	83	.....	..
1934	72,170	8	827,850	92	.....	..
Western Connecticut:						
1932	329,840	30	534,460	49	234,590	21
1933	371,860	37	508,620	51	123,500	12
1934	326,340	30	524,330	49	227,800	21

SAND AND GRAVEL SOLD OR USED BY PRODUCERS OPERATING IN THE NEW YORK METROPOLITAN AREA, 1924-34[1]

Year	Sand		Gravel		Total sand and gravel	
	Short tons	Value	Short tons	Value	Short tons	Value
1924	5,889,592	$2,564,462	1,957,705	$1,682,143	7,847,297	$4,246,605
1925	6,546,791	2,861,135	2,288,143	1,964,658	8,834,934	4,825,793
1926	8,014,598	3,003,974	2,390,276	1,887,898	10,404,874	4,891,872
1927	8,671,942	3,642,671	3,140,285	2,554,779	11,812,227	6,197,450
1928	9,188,691	3,889,818	3,125,519	2,429,604	12,314,210	6,319,422
1929	7,906,199	4,934,516	3,385,526	3,042,538	11,291,725	7,977,054
1930	6,441,517	3,000,618	3,434,356	2,652,167	9,875,873	5,652,785
1931	5,887,147	2,753,428	3,214,379	2,573,652	9,101,526	5,327,080
1932	2,950,470	1,406,245	1,470,612	1,333,366	4,421,082	2,739,611
1933	1,811,749	744,740	670,476	506,109	2,482,225	1,250,849
1934	1,214,009	699,601	853,222	717,005	2,067,231	1,416,606

[1]Includes Goodwin-Gallagher Sand & Gravel Corp., Nassau Sand & Gravel Co., O'Brien Brothers Sand and Gravel Corp., Great Eastern Gravel Corp., Seaboard Sand & Gravel Corp., Henry Stearns, Inc., and Rosoff Sand & Gravel Corp.

METHOD OF TRANSPORTATION OF SAND AND GRAVEL IN THE NEW YORK METROPOLITAN AREA, 1932-34

	Railroad		Trunk		Barge	
Year	Short tons	Per cent of total	Short tons	Per cent of total	Short tons	Per cent of total
1932	9,809	0.2	7,278	0.2	4,403,995	99.6
1933	.....	..	.....	..	2,482,225	100.0
1934	247	(1)	7,104	0.3	2,059,880	99.7

[1]Less than one-tenth of one per cent.

Helpful Publicity

Illinois State Geological Survey, and the Illinois Chamber of Commerce are preparing and releasing a weekly story, to the state's newspapers designed to sell the people of Illinois on the state's mineral reserves. The first releases are mostly on coal, but others will follow on limestone and rock products.

Resume Production

Lone Star Cement Co., Kansas, Bonner Springs, resumed production March 2.

Missouri Portland Cement Co., Independence, Mo., plant resumed production March 2.

Lehigh Portland Cement Co., Iola, Kan., plant resumed production March 1, after a shutdown since September 15, 1935.

Edison Portland Cement Co., New Village, N. J., resumed production March 2, after a shutdown since December 16, 1935. It is reported the company has an order for 420,000 bbl. from the Port of New York Authority.

Alpha Portland Cement Co., Manheim, W. Va., plant resumed production March 16.

Universal Atlas Cement Co., Hudson, N. Y., plant resumed production March 16. Various new equipment was installed during the winter shutdown.

Lone Star Cement Co., Hudson, N. Y., plant was scheduled to resume production April 1.

Olympic Portland Cement Co., Bellingham, Wash., resumed production March 9.

Universal Atlas Cement Co., Hannibal, Mo., plant resumed production February 29.

Monolith Portland Midwest Co., Laramie, Wyo., resumed production February 14. A nine months' run is anticipated.

Beaver Portland Cement Co., Gold Hill, Ore., was scheduled to resume production March 1, with the outlook for business about the same as last year.

To Expand

Monsanto Chemical Co., Birmingham, Ala., owning and operating the plant of the former Swann Chemical Corp., at Anniston, Ala., is planning purchase and operation of rock phosphate properties, including erection of a plant to make new products.

Limestone Needed

SOME IDEA of the prospective market for agricultural limestone may be gained by a recent soil survey in Peoria County, Illinois. Agronomists of the University of Illinois estimated 541,129 tons would have been required in 1935 to correct acidity alone; actually some 70,622 tons were applied. Similar conditions exist throughout the corn belt.

A New Product CALLED FOR NEW EQUIPMENT

National City, Michigan, Wall Board Plant Modernizes in Order to Make a New Plaster

By Bror Nordberg

TO SUPPLY the new "Gold Bond Microplastic" plaster, the National Gypsum Co., National City, Mich., installed two Allis-Chalmers tube mills in 1935. (A description of the plant when new was published in Rock Products, July 23, 1927.) The regular first-settle stucco is fed to the tube mills by a regulation chain feed. The mills, which have inside dimensions of 6 ft. in diameter and 22 ft. long, are driven, each by a 250-hp. G.-E. motor through a silent Link-Belt chain drive. Each mill contains 25,000 lb. of steel balls 1¼ in. in diameter and turns 25 r.p.m. A temperature of approximately 250 deg. F. is required in the mills to attain the desired plasticity, and the feed to the mills is regulated to give the desired temperature. Normal running results in 10 to 12 tons per hour. Special plasters are given especially high plasticity. The plaster before grinding has an 85 to 100 plasticity. After grinding, the plaster goes to 250-ton bins and is packed in special, tight bags by a Bates packing machine.

A three-unit Firite automatic stoker (type A) was recently installed on the Sterling boiler which supplies the heat for the board dryer. It operates with a force feed furnished by a No. 50 Clarage fan (type SP), driven by a 20-hp. G.-E. motor at 1160 r.p.m. through a direct drive. Coal is fed to each unit from a 55-ton bin through a spout to each unit. The stoker is driven by a 1½-hp. G.-E. motor, and the feed is controlled automatically at a panel switchboard.

Re-Use Dryer Steam

The board dryer has been equipped with a closed circuit water system. Seven 1¼-in. and two ¾-in. Coe "Drainators" have been installed at various points around the sides of the dryer to drain the steam condensate from the coils in the dryer. A Westco pump with 4-in.

Roll conveyor carrying gypsum boards to dryer. Tray in foreground is an automatic turntable for turning the board over. Incline to racks is at left, while at right are incline and roll for carrying defective board to waste

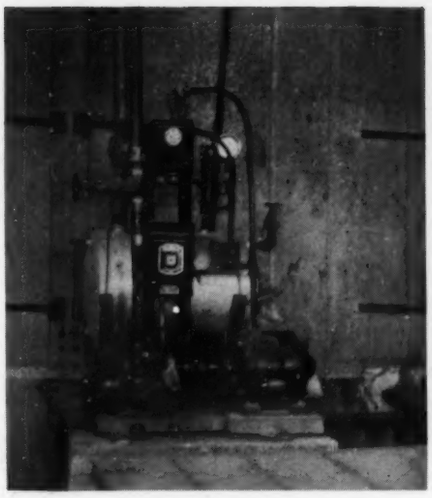
suction and 3-in. discharge and driven by a La Self-Start 25-hp. 3-phase motor at 1770 r.p.m. has been installed at the boiler panel board to pump the condensed steam back to the boiler. Each Drainator collects the condensed steam from a section of dryer coil and by its own pressure forces it along toward the pump at the boiler. This water passes to a 100-gal. steel tank at the pump. A float inside the tank operates the starting switch for the motor driving the pump. When the float is at the full, or "up," position, the switch is tripped and the pump is set in operation, pumping the water into the boiler. When the float reaches the low position, the switch is again tripped and the motor is stopped, allowing the tank to fill up again.

A similar smaller unit has been set up at an intermediate point in the line to help the Drainators when they have insufficient pressure to force the water back to the large tank. This unit consists of a 30-gal. tank and a 2-hp. Louis Allis motor, direct-connected to a type 3 R, model 615 Westco pump operating at 1750 r.p.m.

The panel board at the boiler is equipped with a Foxboro time pressure recorder, a boiler pressure gauge, tank pressure gauge (100-gal. tank) and a boiler water gauge.

Transfer Table and Turntable

The roll conveyors for carrying the gypsum board to the dryer have recently been improved and a turntable added. The board travels toward the end of the building away from the mixing unit. At the far end a transfer is made, and the travel is in a right-angle direction to the original line of travel. An automatic turntable has been placed to turn over the board so as to bring the finished side to the top to protect its surface. When lath or other board products are being run which do not need turning over, the table is eliminated and the board passes over it direct. Gold Bond board ⅜-in. and ½-in. is turned over. As much as 11,000 ft. or 344 boards per hour can be turned over by this installation. Another transfer takes place beyond the turntable, and the travel is now toward the feed end of the dryer, which has six decks. A tipple automatically passes the board to the proper deck, from top to bottom progressively in steps. This equipment is all manufactured by the Coe Manufacturing Co.



Pump and pressure tank forces condensed steam back to pump at boiler

Provision has been made before the first transfer to remove faulty board. A set of rolls has been installed (home-made) above and parallel to the line of travel from the mixer toward the rear end of the building. When the "spotter" locates a bad board, a hand control will let down a sloping piece of steel, and the board will pass up this slope to the rolls above, which carry it out.

A 6-ft. extension has been added to the end of the dryer for use in cold weather only. When the weather is extremely cold, cold rollers and other equipment result in a condensation on the board. This extension has been provided to preheat or remove this condensation and prepare the board for the sudden change in temperature which will take place as it goes into the dryer. Six banks of 1¼-in. coils have been installed in the extension, a fan driven by a 2-hp., G.-E. motor furnishing air for the top three banks and a similar one for the bottom three. The moisture-laden air discharges up a chimney flue. The board is kept from "fluffing up," and an even texture is maintained through use of the extension.

A 3-hp. Master motor operates the turntable.

A 3-hp. G.-E. motor, the tipple.

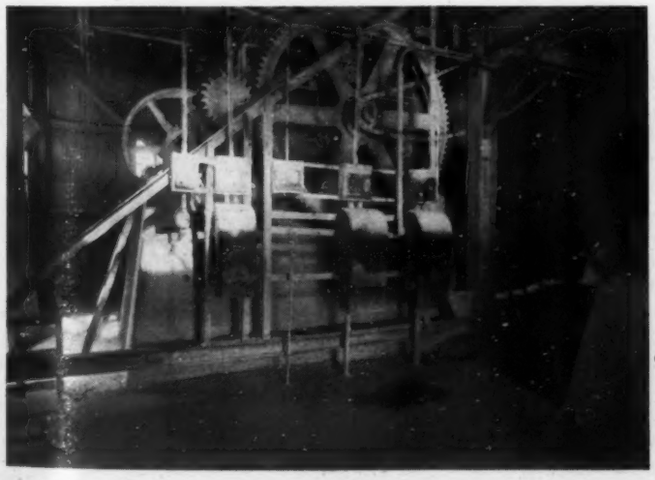
A ¾-hp. G.-E. motor, the tipple belt.

A ½-hp. G.-E. motor raises the transfer.

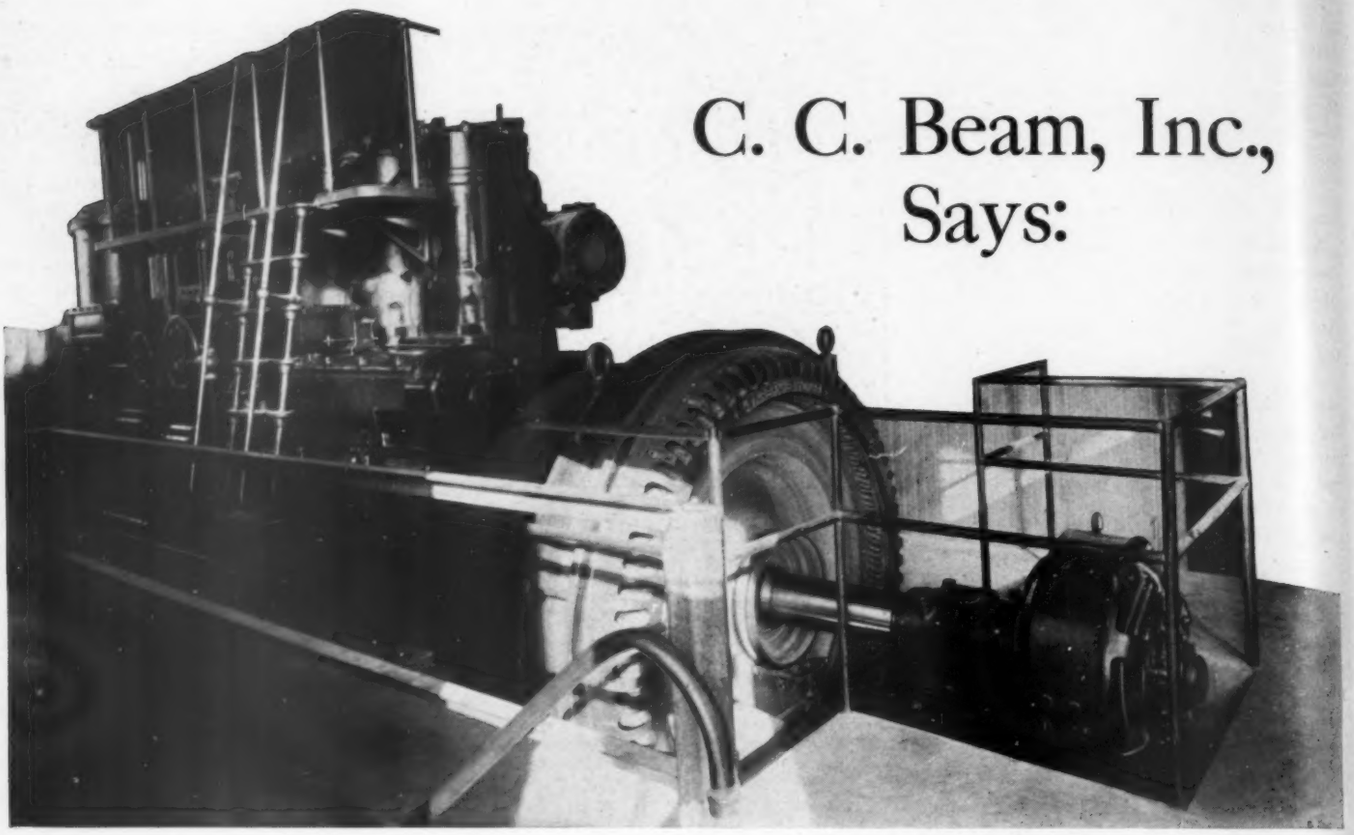
A ¾-hp. G.-E. motor drives the rolls.

A 2-hp. Master gear-head motor works the automatic stop on the transfer table.

The National Gypsum Co. recently took over the Universal Gypsum and Lime Co. plants and has announced its intentions to bring them up-to-date in a similar manner.



Above: Left—New primary crusher at National Gypsum Co. plant. Right—Secondary crusher. Below: Left—View in boiler room. Note pump and pressure tank. Right—Incline for raising boards to racks preceding dryer. In background is incline to raise defective boards



C. C. Beam, Inc., Says:

Diesel generator installation. Note direct current excitor generator at right end of shaft

We're Now Using DIESEL Power

C. C. BEAM, INC., Melvin, Ohio, has cut its power bill considerably since the installation of a Diesel-generator set. The company had been operating two Fairbanks-Morse Diesel engines for several years—a 200-hp. engine to drive an 8x9-in. air compressor and a 30-in. Worthington primary crusher; and a 100-hp. engine to drive a 6x6-in. compressor and a 4-ft. Symons cone secondary crusher. The latest installation is a Fairbanks-Morse, Diesel-generator set, designed to furnish electrical power for all plant operations exclusive of the crushers. Provision has been made, by a 24-kw. hook-up, for lighting and auxiliary electrical requirements, to be taken from the regular power lines.

A new power house, entirely of precast 16-in. concrete units, was built to house the power unit and auxiliary equipment. The structure above ground is 18 ft. high by 37 ft. by 15 ft., and the basement room is 8 ft. high. The 525-hp., 5-cylinder Diesel is mounted in the center of the upper floor and is direct-connected to the alternating current generator. The Diesel is a model 33, style M, operating at 300 r.p.m. The Fairbanks-Morse alternator, type T6ZO, is a 3-phase, 60-cycle generator with a rated capacity of 357.6 kw. at sea level. It supplies power at 440 volts for the plant machinery.

The excitor, mounted on the end of the shaft and rated at 12.5 kw., is a shunt-wound, direct-current generator, type MX. This floor level is complete with two panel instrument boards with AC and DC ammeters and voltmeters, exhaust temperature indicator manufactured by the Brown Instrument Co., G.-E. polyphase Watthour meter type D-14, hot and cold water gauges and lubrication oil gauge. Transformers are not used, but a G.-E. voltage regulator maintains a constant voltage reading of 440 volts.

Auxiliary Equipment

The plant is equipped with a "Hydroil" unit for cleaning transmission oil, for reuse in the engine crankcase. This unit is driven by a ¾-hp. Fairbanks-Morse motor. A 60-cycle, 7½-kva. type RD transformer (Maloney Electric Co., St. Louis, Mo.) steps the voltage down from 440 to 110 volts for use in the Hydroil unit.

The plant is equipped with a hot well and heat exchanger, the amount of cold water being regulated to control temperature. A Fairbanks-Morse, 3-phase, 10-hp. induction motor operating at 1800 r.p.m. drives the Fairbanks-Morse pump when pumping cold water, and similar units serve for pumping the hot water.

A 5-hp., Fairbanks-Morse pump operating at 1200 r.p.m. drives an auxiliary pump which circulates oil through the bearings before starting and after the engine is shut off.

A Fairbanks-Morse air compressor, 3¼ in. by 3⅜ in., is driven by a 3-hp. motor to supply compressed air under 240-lb. pressure for use in starting the engine.

A ⅓-hp. Master motor running at 1725 r.p.m. drives a small pump which is used for pumping oil in and out of the crankcase.

The water supply from a creek nearby is very hard, so the jacket water is treated to keep the jackets clear of scale. A 3600-gal. tank normally used for supplying steam shovel water is used in applying the water-softening treatment.

A 12,000-gal. tank in the yard is used for

oil storage for all three Diesel engines. A 600-gal. tank in the new power house is kept full from the large tank and is used to supply the new Diesel alone. Power is now furnished at low cost, the new Diesel only using 24-gal. fuel oil per hour.

New Product

Barnsdall Tripoli Corp., Seneca, Mo., oldest and largest producer of genuine tripoli, has begun production of a new American pumice, which is claimed to be the equal in every way of Italian pumice.

An experimental washing and sizing plant has been built at the deposit near Grants, N. M., and is now in operation. An experimental grinding and sizing plant has also been built at Seneca, Mo. The material will be marketed under the trade name "Valencia" pumice.

New Superintendent

United States Gypsum Co., Chicago, Ill., has appointed P. F. Goltry, Chicago, superintendent of its newly acquired lime plant at Evans, Wash.—formerly the Idaho Lime Co.

Moves Department

United States Gypsum Co., Chicago, Ill., is reported to have moved its acoustic tile manufacturing department from Fort Dodge, Iowa, to Port Clinton, Ohio. Fred Gaugh and J. Benoit, superintendent and foreman, respectively, of Fort Dodge, have been transferred to Port Clinton. The product is said to be made of gypsum and glass wool, and to be much used in auditoriums and broadcasting studios. Several improvements are under way to expand the facilities of the Port Clinton plant.

Another view of Diesel generator installation

To Enlarge Plant

Ruberoid Co., manufacturers of asphalt and asbestos-cement building and roofing products, recently started construction of an extension to its Mobile, Ala., plant. The extension, which will cost over $200,000, will be completed by July 1.

Contemplates Improvements

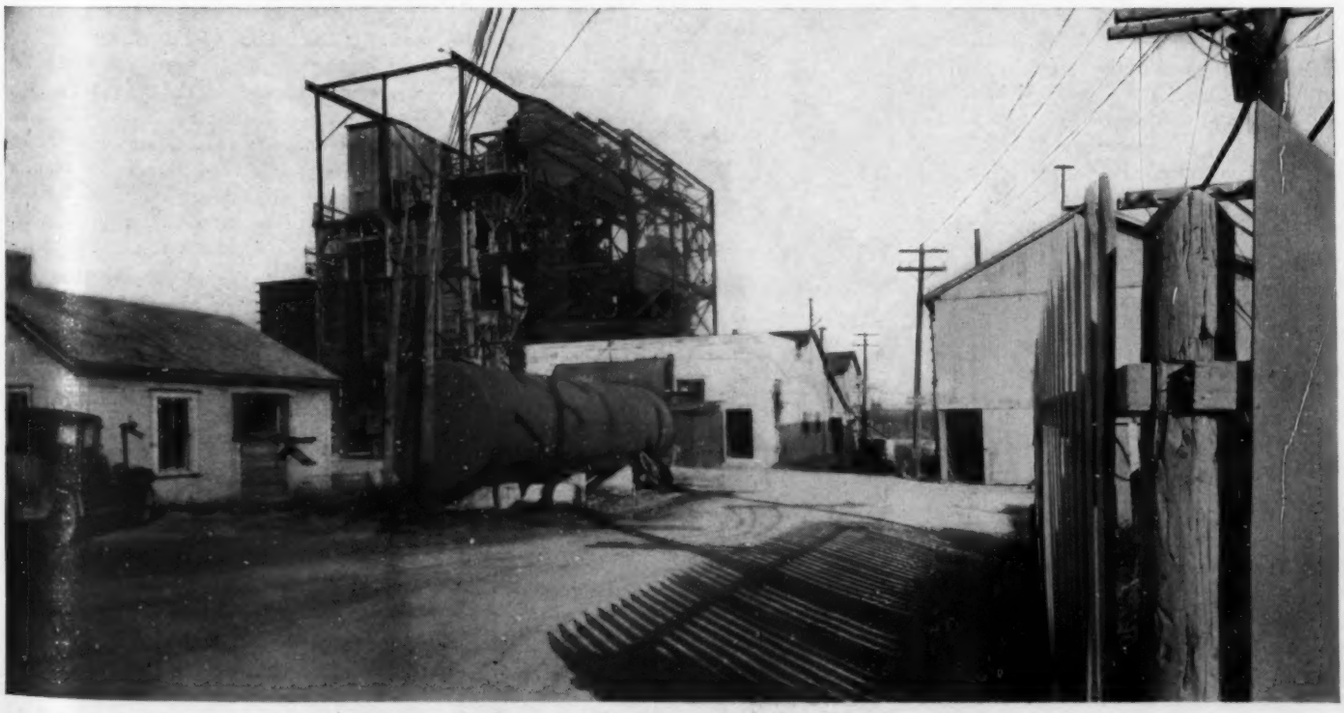
United States Gypsum Co., Chicago, Ill., is contemplating extensive improvements at its Heath, Mont., gypsum plant, according to local report. G. M. Newsum is superintendent.

Reopening Plants

Green Hill Mining Co., near Gouverneur, N. Y., is reopening its two feldspar mines and milling plant which have been closed since 1934. J. Herman McLear is president.

Wants Quotations on Terrazzo

Carrara Marble and Terrazzo Co., Ltd., P. O. Box 2061, 8 Old Court House Corner, Calcutta, India, wants quotations and samples from American producers on crushed marble and stone for terrazzo floors—quotations c. i. f. Calcutta.



General view of stone crushing plant of C. C. Beam, Inc.

Fan Drilling *for* Blasting Rock

(Contributed by a Quarry Superintendent)

FAN DRILLING is a method of drilling a series of holes directly into the face of a quarry as shown in Figs. 1 and 2. After one series of holes is drilled, the drill is moved along the face, usually 7 ft., to the next setup, etc., until the required length of the face is drilled.

This system of drilling rock will eliminate moving the drill many times, as a series of from five to eight holes can be drilled from one setup. (See Figs. 1 and 2.) As many as 24 holes have been drilled from one setup; this being done by swinging the drill first to the right at the proper angle, drilling a series of perhaps eight holes, then swinging the drill square with the face and drilling eight more holes, then swinging the drill to the left at the proper angle and drilling eight more holes, making 24 holes in all that can be drilled from one setup.

A series of 24 holes could be drilled with a setup as shown in Fig. 2. This would make a double fan set of holes, as the drill holes would fan with the length of the face and also vertical with the face. However, the double fan holes are only used where it is difficult to find a continuous setup along the face, as better results are obtained if the drill is moved after each single series of holes is drilled. A series of fan holes when blasted will open like a large fan in the face of the rock.

Drilling holes at different angles as outlined will give better fragmentation of the rock, as the lines of force of the explosive will be in all directions. Also all the drill holes are located in sound rock, thus eliminating the gas from the explosive leaking through the crevices. The solid back will give the explosive a chance to break rock and will avoid the forces being cushioned by a soft back.

With this system, a quarry face from 50 to 80 ft. high can be broken at one time. Fig. 1 illustrates a series of holes drilled in a quarry face 50 ft. high. On the floor of the quarry the reader will notice a rock pile 8 ft. high, upon which the tripod is set. The drill mounting is usually 4 ft. high. This will set the drill center 12 ft. above the quarry floor. The first hole is drilled at an angle, so that a 16-ft. steel will drill 2 ft. below the quarry floor, which will be the first hole drilled in the series. The machine is then adjusted on the tripod so that the second hole will bottom 8 ft. above the first hole. This operation is continued until the top hole is drilled, which is 20 ft. deep and will bottom an equal distance in the face of the rock to compare with the rest of the holes that are drilled 16 ft. deep.

The reader will notice that in Fig. 1 there are two holes drilled from the top of the quarry. These two holes are drilled from one setup, and are usually drilled 14 to 16 ft. back from the quarry face. The first 20-ft. hole is drilled on an angle so that it will bottom 8 ft. ahead of the second hole which is drilled vertically 18 ft. deep. The vertical hole is drilled 18 ft. deep so the 20-ft. hole and the 18-ft. hole will bottom on the same level. This operation being completed, the drill is moved along the face, usually 7 ft., until the required length of the face is drilled.

Fig. 2 illustrates a series of holes drilled in a quarry face 83 ft. high. It is rather a double series. One series of holes is drilled from the quarry floor, and the second series is drilled from a bench which was obtained by first shooting a double row of drilled holes from the top of the quarry. This double series of holes in Fig. 2 is drilled in the same manner as the single series of holes in Fig. 1, except as shown in Fig. 2 there are no top holes. These two illustrations are only a few of the several examples where this fan system of drilling for blasting rock can be used. Many different uses for fan drilling in the quarry will be found after the system is once employed.

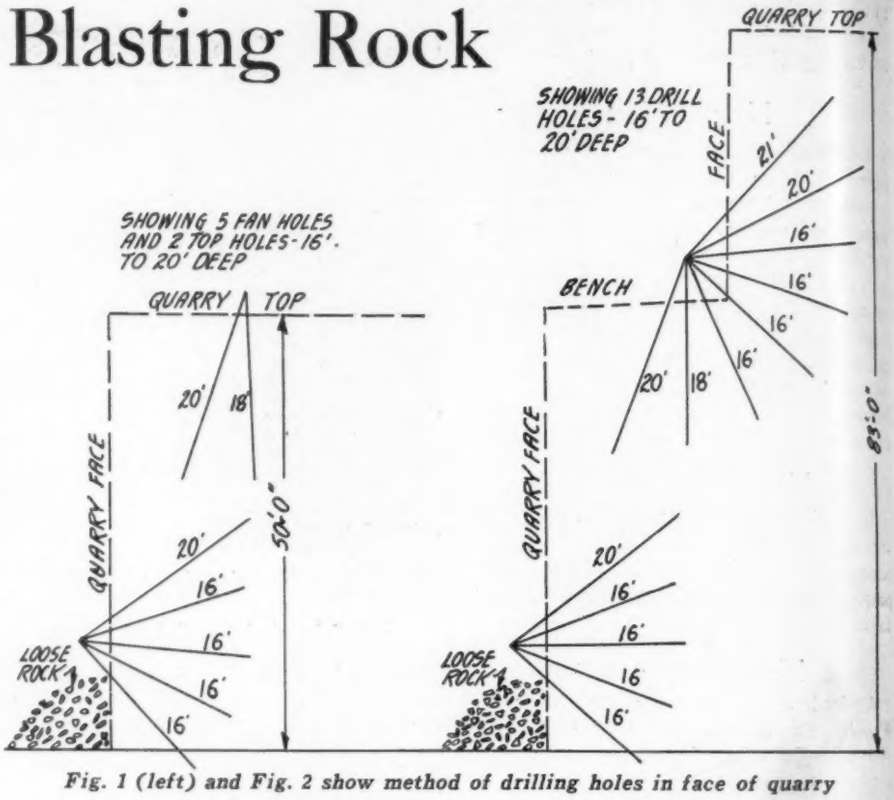


Fig. 1 (left) and Fig. 2 show method of drilling holes in face of quarry

Editor's Note

THE AUTHOR of this article is an experienced superintendent, and his contribution is the result of experience gathered in 10 years' blasting practice in his quarry. He believes the system of fan drilling described is the best for his conditions. In his operation of over 20 years the well-drill system, the piston type drill and now the hammer type drill with special blower and hollow steel have been used.

Springing of the Holes

It is necessary to spring only the toe holes, or the holes that penetrate the quarry floor. The present hollow-steel, rock drills make it more economical to drill many holes than to drill fewer holes and to spring them with explosives. This method also eliminates the danger of flying rock in the quarry, which causes delay in the rest of the operation.

Loading of the Holes

To save time in loading holes, the correct size of stick powder should be used. Usually, the drill used on a tripod mounting, drills a hole large enough so that the holes bottom at 2 in. For this size hole 1¾-in. stick powder should be used. Each stick should be slit with a knife before it is put into the drill hole, then each stick of powder should be firmed down with a tamping rod. The tamping assures the holes being filled solid with powder. The electric blasting cap is placed in the center of the powder to assure the proper detonation of each hole. A 12-ft. electric blasting cap is well suited to this type of blasting, as there will be no excess wires when the connecting is done,

thus assuring speed in connecting the wiring for the shot. The amount of powder that is required in each hole must be determined by the man in charge at each different quarry. Usually a 16-ft. hole, which is drilled in medium hard jacket breaking limestone that carries 29 cu. yd. of rock, requires loading 9 ft. with powder and 7 ft. with stemming.

Stemming the Drill Holes

All the down holes are tamped with loose stemming, but the flat and upper holes require special stemming, as it is almost impossible to place loose stemming in flat or up holes. The special stemming is manufactured in the quarry, and usually it is larger in diameter than the sticks of powder, as the circumference of the drill hole that receives the stemming is larger than the circumference of the drill hole that receives the powder.

For the reader who is not familiar with the manufacture of the stick stemming, the writer suggests the following method: Get a good grade of wrapping paper. Take the paper off a stick of powder to use for a pattern. Cut the wrapping paper to the pattern. After the paper is cut, roll the cut paper into cartridges using a piece of 1½ in. pipe as a form. Close one end of the cartridge while still on the pipe and leave the other end open to receive loose stemming. Then take the cartridge off the pipe form and fill with stemming. The stemming cartridges should be made in advance to avoid delay at the time of blasting.

Wiring the Shot

Parallel series circuit is used and can only be employed in connection with lighting or power circuit. A 100-drill-hole shot illustrated: When 100 drill holes are loaded and are to be exploded together, they are divided into four series, making 25 drill holes in each series. The 25 holes are connected together in the regular way. No. 20 connecting wire is used to carry each series to the main lead wires. A galvanometer is used to test each series before the series is connected to the main lead wires. It is important that each series carries the same number of electric blasting caps so that the ohms of resistance in each series are nearly the same. This is necessary so that each series will be of the same sensitiveness to the electric current and one series will not explode ahead of the others, which would dislocate the wire of the other series resulting in a bad shot. If the number of electric blasting caps should not divide equally in a shot, it would be necessary to connect extra ones in the series that has not the correct number of blasting caps.

To illustrate: A 98-drill hole shot would be three series of 25 holes each and one series of 23 holes. It would be necessary to connect two extra electric blasting caps in the series that has only 23 in order to make the 23-hole series carry the same number of blasting caps as the 25-hole series.

The main lead wires should be tested each time before blasting. To insure a safety factor in blasting, the power line should be of 220 volts if possible. It is known that the resistance in electric blasting caps is not the same, and if the power line is weak the blasting caps with the least resistance would explode first, which would dislocate the wire before the caps with more resistance could have time to explode. Most all trouble of this nature will be eliminated with a power line of high voltage and amperes.

The Parallel series system is used to insure a strong current. Usually from 75 to 150 holes are blasted in one shot. If a shot of this size were connected in one series, there would most surely be missed holes, as the electric flow of current would be so weak that a small difference in resistance in the electric blasting cap would cause the caps of low resistance to fire and the ones of high resistance to miss, resulting in a poor shot. To eliminate missed holes, 25 or less electric blasting caps should be used in one series.

Conclusions

The fan drilling and blasting will give better fragmentation, which is advantageous to smooth operation, as large rock will slow down production causing shovel repairs, car repairs, and crusher repairs. Secondary blasting is reduced to a minimum, saving time in moving the power shovel, besides saving the expense of the secondary drilling and blasting. The cost of the fan system of drilling is as cheap as any drilling, ton for ton of rock, as it is only necessary to move the drill approximately every 100 ft. of holes drilled. The greatest advantage of fan hole drilling and blasting lies in the fact that the face of the quarry is drilled complete, while the solid rock is still in place, and when the shot is fired the yardage of rock thus blasted is all ready for the power shovel to load into the cars or trucks, and is of such a size that the crusher will receive most of the rock without any extra work.

The aim of this system of drilling and blasting rock is to eliminate delays and break-downs in quarry operation.

Buys Mine

Ruberoid Co., New York City, has purchased asbestos mines at Eden, Vt., through a subsidiary company, Vermont Production Co, Inc. The property, with prospective additions comprises about 1700 acres on Belvidere mountain in Lamoille county. It belonged to the Vermont Asbestos Corp. Plans for rapid expansion of the company's operations, including additions to the present asbestos fiberizing plant which will greatly increase production, have been completed.

New Project

E. H. Fluorspar Co., Versailles, Ky., has leased 25 acres in Woodford county, near Munday's Landing, to **Ralph E. Jones,** Indianapolis, Ind., who will operate.

Damages in Reverse

Auxvasse Quarry Co., Auxvasse, Mo., was recently awarded $300 damages—the amount asked—as the result of a collision between one of its trucks and a Chicago motorist. The case is interesting because usually it is the corporation which gets stuck in such accidents. The accident occurred November 28, 1934, about two miles north of Auxvasse on Highway 54. The case was tried before a circuit court judge without a jury.

The evidence was that Ollie Henderson, Negro, was driving a 3-ton truck. There was a slight mist and as he "came over the hill" he saw the car right in front of him. He said he pulled sharply to the left but struck the left rear fender of the car and badly damaged the truck.

The motorist stated that he had had a blow-out of a tire and had stopped to repair it. He said he had his lights burning, in contradiction to the testimony of the Negroes on the truck. His car was wrecked.

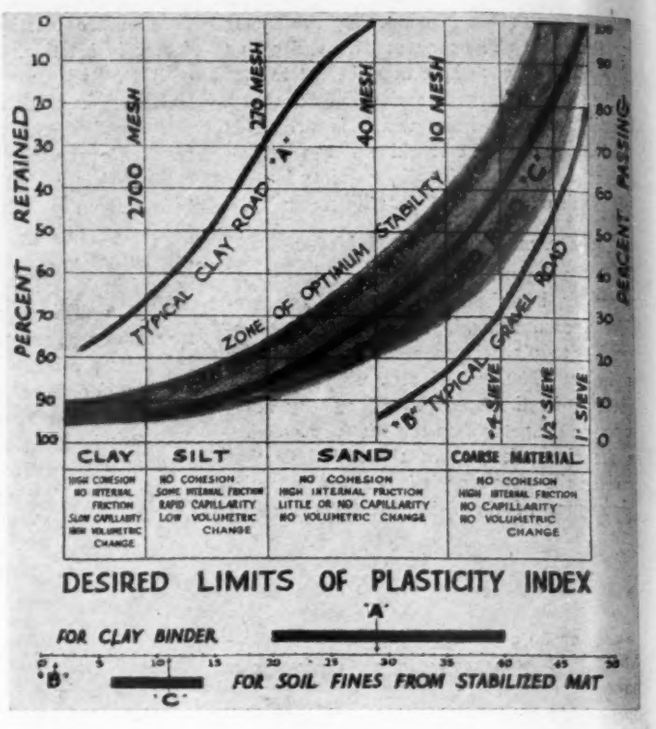
Magnesite Statistics

Statistics: According to the U. S. Bureau of Mines, during 1934 production of 100,973 short tons of crude magnesite was reported from three mines in California and one in Washington. This was a decrease of 6.7% from the quantity mined in 1933 (108,187 tons), but it still showed a substantial increase over 1932 (38,462 tons). The total consumption of domestic magnesite was lower than in 1933, but this decrease was accompanied by a moderate increase in imports. With the exception of a very slight increase in the quantity of crude magnesite sold by producers, all sales showed decreases in both quantity and value. Sales of magnesite of domestic origin in 1934, as reported by producers, were 1588 short tons of crude, valued at $18,393, an increase of slightly less than 1% in quantity and a decrease of 11.4% in value compared with 1933; 7528 short tons of caustic calcined, valued at $222,415, a decrease of 7.5% in quantity and 10.7% in value from 1933; and 38,535 short tons of dead-burned, valued at $670,343, a decrease of 11.6% in quantity and 13.5% in value from 1933. There was an increase in the quantity of magnesite sold for insulating, and in addition to sales of magnesite for refractory, plastic, insulating and medicinal purposes, some special calcined material was sold to the rubber trade.

North Carolina Vermiculite

Karlock Minerals, Inc., Asheville, N. C., has been chartered to develop a vermiculite deposit in western North Carolina. Vermiculite is the geological name of a mica mineral which upon heating swells and disintegrates forming a fluffy product much used for insulation, etc., under various trade names.

New Uses for Graded Aggregates



Stabilized road *mixes are made with carefully prepared materials*

ONE of the most intensive promotional campaigns in progress at the present time is that conducted by the producers of calcium chloride and sodium chloride (common salt) to find markets for a surplus product, or byproduct. These producers and manufacturers include some of the largest and financially strongest chemical companies, and in addition, the calcium chloride manufacturers are backed by an energetic trade association.

ROCK PRODUCTS has already published considerable material about the use of these salts in the construction of stabilized road surfaces. Also papers were read at the recent conventions of the aggregates associations at St. Louis, Mo., and at the Road Congress at Cleveland, Ohio. The market thus developed calls for carefully graded and prepared aggregates, from the finest clay to crushed stone, gravel or slag coarse aggregate. With the great demand for secondary, or farm-to-market roads, if this campaign is successful, there should be a much larger market of commercial aggregates.

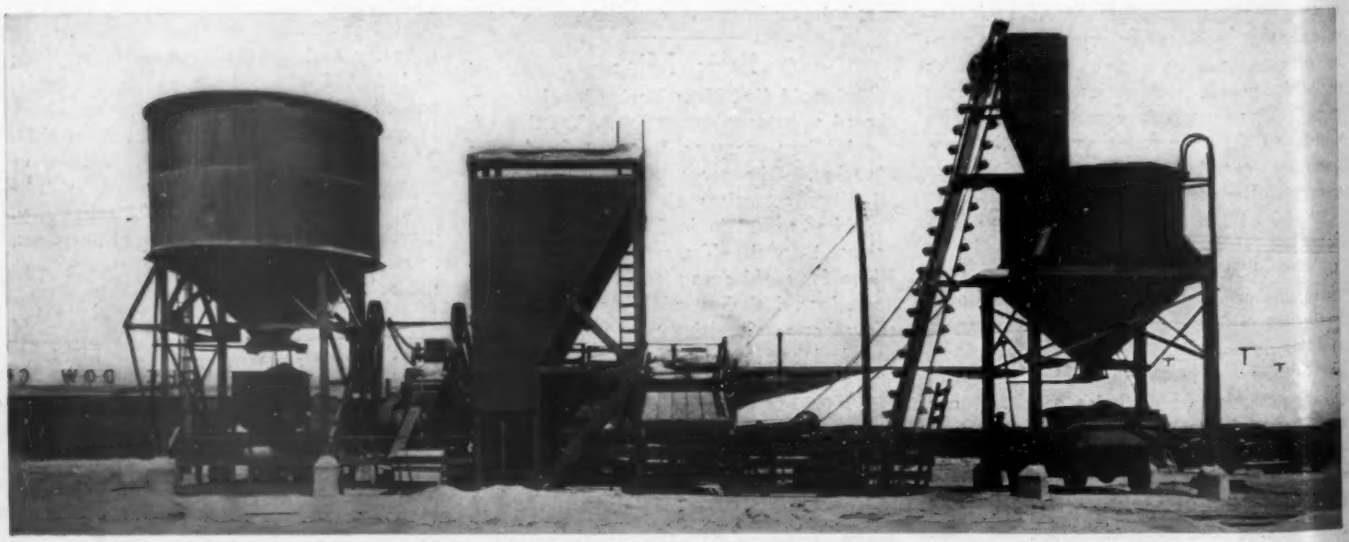
Dow Chemical Co. Plant

The experimental mixing plant developed by the Dow Chemical Co. at Detroit, using slag aggregates, was illustrated on p. 68 of the January issue of ROCK PRODUCTS, and described in the paper read by W. W. Lavers at the annual convention of the National Slag Association (abstracted in ROCK PRODUCTS, February, pp. 46 and 47). In the material presented here are several illustrations showing the details of this plant. Additional data are supplied by L. C. Stewart and S. J. White, of the Dow Chemical Co., as follows:

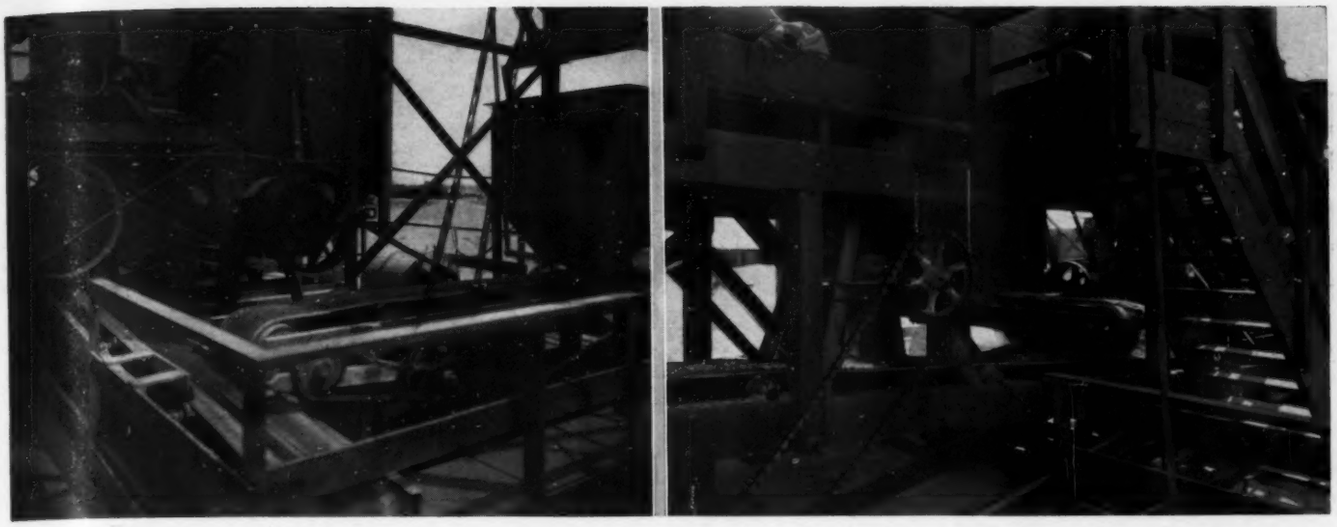
"In operating the plant, clay is dumped into a feeder that has four spiral screws in the bottom. These aid in breaking up the clay while feeding it to an inclined belt conveyor. An adjustable gate on the feeder regulates the rate of feed.

"The conveyor delivers the clay to a disintegrator which consists of a large, slow-speed smooth roll and a smaller, high-speed roll having cutting knives running the full length of it. These rolls are parallel to, and rotate toward, each other. The disintegrator crushes and shreds the clay and discharges it into a crusher, immediately below. This has two smooth rolls of the same size rotating toward each other at the same speed. The clearance between these rolls is approximately ⅛ in., and the clay in passing through them is either pulverized or flattened into thin damp flakes, or both, depending on the amount of moisture it contains.

"A belt conveyor delivers this material, together with the proper amounts of calcium chloride, coarse and fine aggregate, to a pug mill where all ingredients are thoroughly mixed. The required amount of water necessary to produce a damp mix is added during the process. The finished prod-



North view of Dow Chemical Co. plant at Detroit, Mich., for producing stabilized road mixes



Close-up views of materials feeders to main conveyor belt at Dow plant. Left—Coarse aggregate. Right—Calcium chloride and sand

uct is elevated to a storage hopper from which it is delivered to trucks. Four motors having a total of 112 hp. are required to operate the plant.

"This equipment appears to be desirable when a tough, highly plastic clay is employed. If sand-clay strippings are available it is sometimes possible to partially break up such material by screening through a grizzly and relying on the pug mill to accomplish any further breaking up of the binder-soil which is necessary. This eliminates the use of the disintegrator and roll crusher and, of course, reduces the power requirements.

"Other combinations and arrangements of equipment are also possible, depending on the nature of the materials which are available. The cost of producing the plant-stabilized mix likewise depends on the character and availability of the local raw materials.

"Such a plant appeals to aggregate producers. In many cases it is possible to use an overburden of sand and clay which otherwise would have to be hauled away and discarded. This means the conversion of a formerly wasted material into something of real value. Also, at some plants there is an accumulation of aggregates of little value, which when properly combined with calcium chloride, sand and clay, produce a very satisfactory stabilized road material."

Calcium Chloride Association

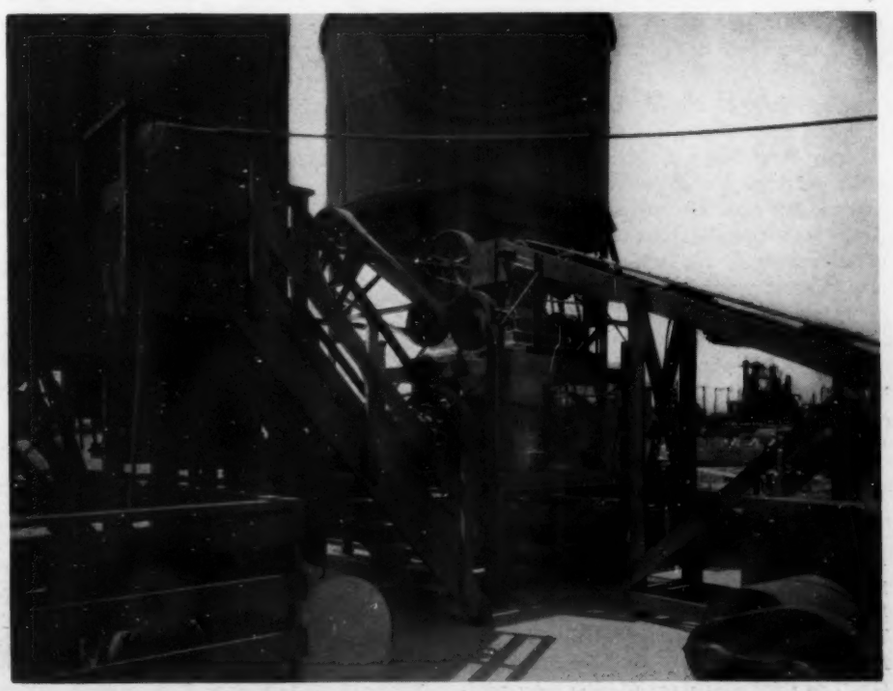
The Calcium Chloride Association has issued a number of bulletins on stabilized road surfacing, and on the plant required. These were described in detail in a paper read by B. C. Tiney, chief engineer of the Calcium Chloride Association, at the recent annual convention of the National Crushed Stone Association. Copies of this paper may be obtained from Mr. Tiney (an abstract giving his recommendations as to the various sizes of aggregates to be used was published in Rock Products, February, p. 66).

Portable Plants

Satisfactory aggregates have been prepared in a specially designed portable plant. Data on this plant have been supplied by Ray A. Giddings, secretary of the Calcium Chloride Association. The plant was used for a road surfacing job near Minneapolis, Minn., and is shown in two of the accompanying illustrations. It was designed and built by the Pioneer Gravel Equipment Manufacturing Co., and is similar to that described in Rock Products, November, 1935, p. 25, which was used by a producer-contractor at New Hudson, Mich., to make top dressing for gravel roads.

The Minnesota plant, in addition to the usual equipment of a portable sand and gravel plant, has a portable clay crushing and mixer unit. This crushing unit makes it possible to pulverize the clay either wet or dry, and includes a pug mill to mix the clay with the other materials. An automatic calcium chloride feed is also a part of the unit. Graded gravel for the mix is fed directly to the pug mill by a belt conveyor.

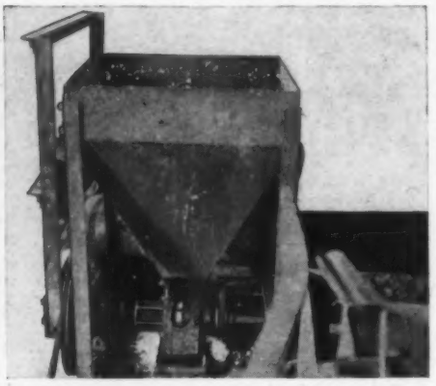
In operating this plant, the clay was dumped from trucks into a storage hopper, from which it was conveyed to a screw feeder by a belt conveyor. The screw feed exerts a crushing action and at the same time controls the amount of clay going into the mix. From the screw feeder, the clay passes to a disintegrator or shredder and



View at Detroit experimental mixing plant, showing clay disintegrator mounted above smooth roll crusher

In the portable stabilizer plant, the belt conveyor feeds clay to a disintegrator, for shredding

then through a roll crusher. The gravel was fed directly to the pug mill from the screening and crushing plant and from the pug mill, the finished mix passed to a storage hopper ready to be loaded into trucks.



An adjustable power-driven feeder under the hopper measures the calcium chloride

Plant Burned

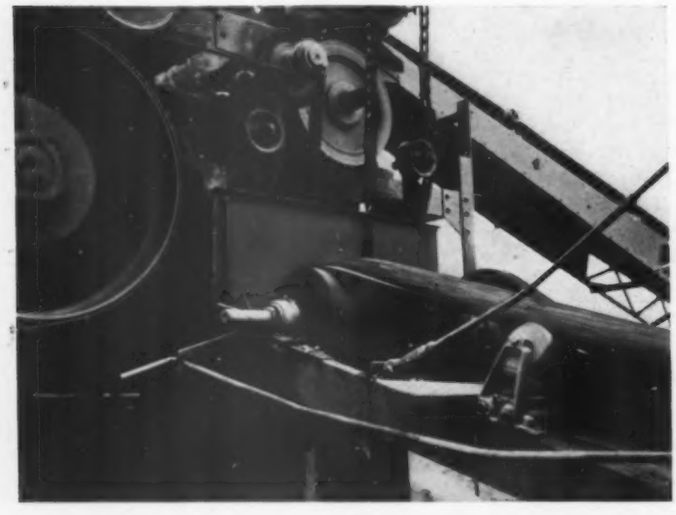
James Stone Co., Corsicana, Tex., lost its crushed stone plant by fire, January 24.

Labor Controversy

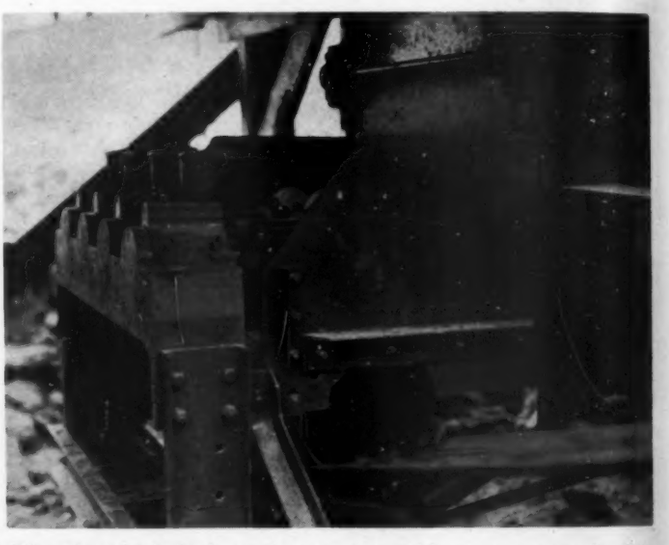
St. Louis Aggregate Producers' Association, St. Louis, Mo., joined by a group of dealers and a plant workers' organization, is said to be at war with American Federation of Labor unions in the building trades. The controversy grew out of a refusal of A. F. L. hoisting engineers and laborers to handle material produced by a member of the Aggregate Producers' Association. Workers at a majority of sand and gravel plants are said to be members of the Rock, Crushed Stone, Sand and Gravel Workers' Union, which is not affiliated with A. F. L.

Moves Shipping Point

Gulf Gypsum Co., Falfurrias, Texas, plans to ship gypsum through Port Aransas instead of Corpus Christi as heretofore.



The gravel and sand are crushed and screened in a separate plant and then delivered into the pugmill on the stabilizer plant

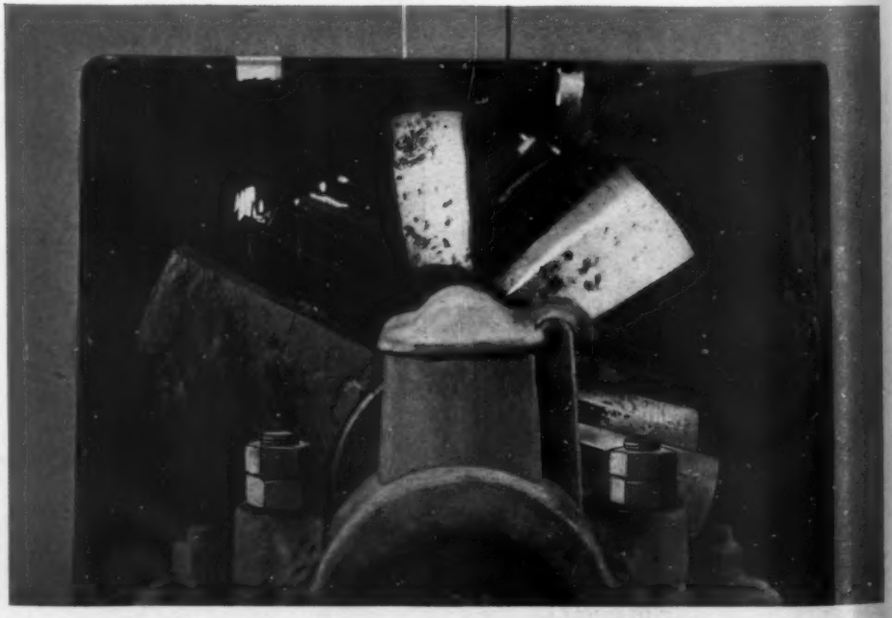


The clay is fed through a trap to this screw type feeder, which breaks up the chunks and deposits an even flow on the belt conveyor

Adaptations of this plant, of course, may be made according to the nature of the pit. At the New Hudson, Mich., plant previously referred to, a sand-clay overburden was used as an admixture to the pea gravel. Soils tests revealed that this deposit was excellently suited for such use, and the sand-clay mixture was of such nature that it was easily pulverized by the action of a vibrating screen without any special crushing device. The experiment in Minnesota, however, demonstrates the practicability of producing such a mixture at the plant even when a highly sticky clay is used.

Buys Asbestos Plant

United States Gypsum Co., Chicago, Ill., has purchased the Jersey City, N. J., properties of the National Asbestos Manufacturing Co. to add to its roofing division. The plant will be operated as the National Asbestos Manufacturing division of U. S. G. The price paid was $650,000. An additional $125,000 will be spent in remodeling and improvements.



The gravel, sand, clay and calcium chloride are thoroughly mixed as they travel through the continuous pugmill

A Successful Enterprise

Monarch Cement Co., Humboldt, Kan., has been a successful enterprise, according to Fred H. Rhodes, its president and general manager. At the company's annual meeting in February, Mr. Rhodes in eulogizing the late H. F. G. Wulf, August C. Kreitzer and Frank A. Wulf, all pioneers in the founding and development of the company's success, said in part:

"Each of these departed directors and officers had served on our directorate since the initial meeting of the stockholders and directors held on these premises September 10, 1913. They each shared the many trials and disappointments of an undertaking to bring order out of chaos, and each has said, 'Had I known as much about the cement manufacturing business when I began as I have learned in later years I would never have undertaken the task.' All of which proves again, 'when ignorance is bliss, 'tis folly to be wise.'

"It required nine long, tedious and tiresome years of diligent physical and mental struggle to mature sufficient profit for the payment of the first dividend.

"They nursed and coddled a very sick infant to a robust business giant, and departing, left behind a monument of stupendous dimensions, a plant and property of a great industry, free from debt, perfectly liquid, with assets valued at twice the amount of the capital invested, and on which capital stock, to this date, has been paid 127% in dividends, totaling $2,173,524.16, to stockholders periodically without lapsing a single year since dividend payments began in October, 1922."

Diesel Power

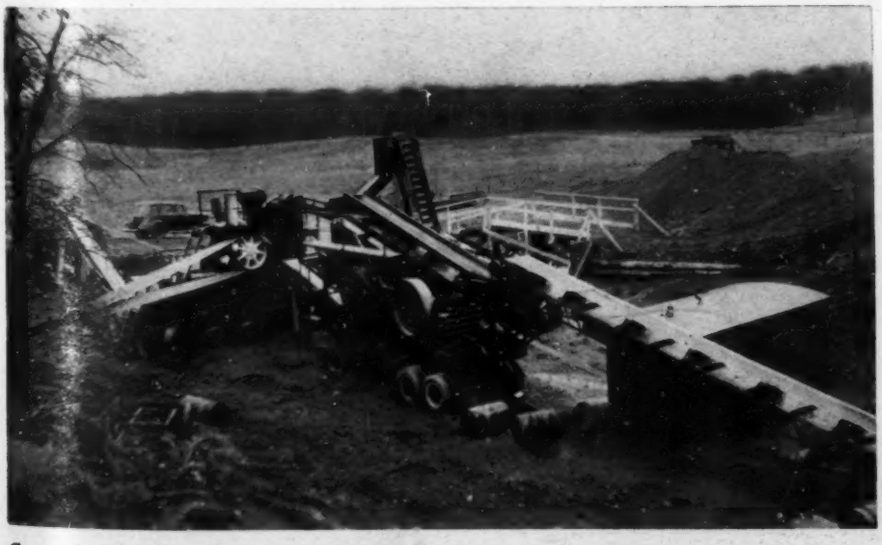
Stone Mountain Granite Co., Stone Mountain, Ga., is installing a new Fairbanks-Morse Diesel engine to make its own power requirements.

A portable clay crushing and mixing unit. The clay feed pit is underneath the bridge in the foreground. Gravel is supplied from crushing unit at left, and finished mix passes to loading bin in the background

Many Producers Do Not Like Wisconsin Code

OPERATION under the various codes of the Wisconsin Recovery Act is being inquired into through public hearings by the counsel for the Wisconsin Recovery Administration. On March 6 and 7 sand, gravel and crushed stone producers were heard, and dissatisfaction was expressed.

The chief criticisms were that the 40-hour week is too short a maximum because of the seasonal nature of the business; at least 55 hours during the busy season should be permitted; the 40-hour week adds materially to power cost as well as labor cost. Price filing was objected to as tending to uniform prices, placing letting of contracts on a lottery basis, which opens the way for possible discrimination. Ready-mixed concrete, not being under a code, gives unpredictable competition.



General view of stabilized gravel mixing plant used in a construction project near North St. Paul, Minn. The gravel crushing unit is in the foreground, and the stabilizing unit is behind it

Want Lower Limestone Rates

AGRICULTURAL COMMITTEE of the Upper Monongahela Valley Association is seeking sources of agricultural limestone which can be sold to farmers at not to exceed $2.50 per ton. The Baltimore & Ohio R. R. has been asked to reduce rates from existing plants. It is estimated 500,000 to 750,000 tons are needed for soil rehabilitation.

Plant Sold

Gibsonburg Lime Products Co., Gibsonburg, Ohio, plant and personal property were sold by the sheriff March 16 following a foreclosure suit by a Toledo bank. C. V. Wolfe, attorney, Toledo, paid $150,000; he is presumed to represent the Price interests as majority stockholders. The property had been appraised by A. A. Weigel, John L. Faist and John S. Sheffer at $136,315.

New Plant

Do-Lite Co., Toledo, Ohio, is building a rotary kiln on the Gibsonburg Lime Products Co.'s property at Gibsonburg, Ohio, to manufacture hard-burned dolomite for the steel industry.

New Development

Rutherfordton, N. C.: A feldspar and mica plant is expected to result from discovery of a large feldspar deposit on the farm of Ed Elliotte, near Gilkey. United Feldspar Corp., New York City, is said to be interested.

To Share Profits

Northwestern States Portland Cement Co., Mason City, Ia., through its president, Hanford MacNider, has adopted a profit-sharing plan for employes. The amounts received will depend on years of service and rates of pay.

Long conveyor goes under Chicago drive to railroad loader on far side. Hoppers are loaded from stock pile

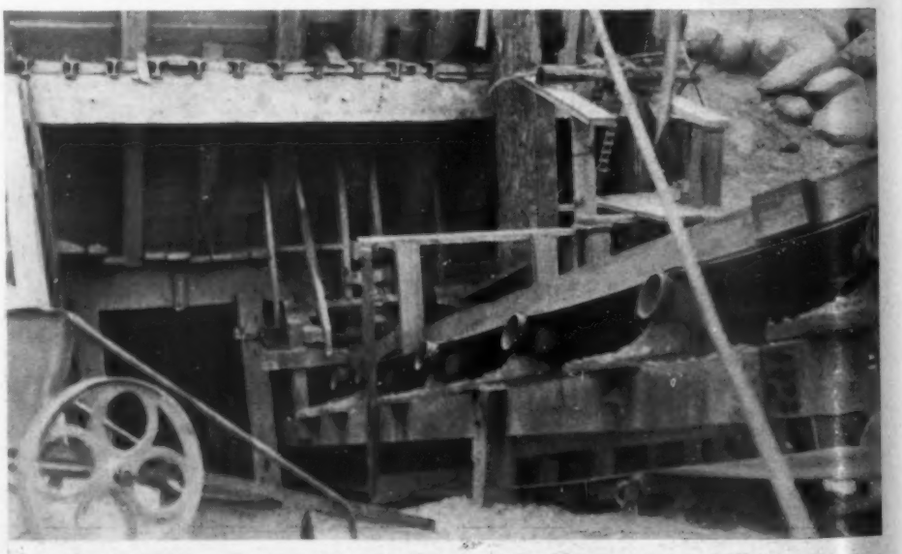
Michigan Gravel Plant Tunnels Main Highway

By Bror Nordberg,
Associate Editor, Rock Products

ONE of the most complete sand and gravel plants built recently that the writer has seen is that owned and operated by the Wm. J. Breen Gravel Co. at Grandville and Burton Streets, S. W., Grand Rapids, Mich. The officers are Wm. J. Breen, president; W. H. Allswede, vice-president; and George Glerum, secretary-treasurer.

A bank deposit is worked east of the 40-ft. Chicago highway drive. The deposit, which has practically no overburden, averages 35 ft., of which about 15 ft. is worked under water. Whenever overburden is encountered, it is of such a nature that it usually can be used for road gravel. Excavation is accomplished by a walking, Diesel-driven Monighan dragline, equipped with a 70-ft. boom and 2-yd. bucket. The bucket fills a 100,000-lb. capacity bottom-dump steel railroad car, which is pulled to the crushing plant by a Whitcomb gasoline-driven locomotive operating on standard gauge track. At the present time, when the excavating is within several hundred feet of the plant, only one car is used, but a second car will be pressed into service when the distance becomes long enough to warrant the addition.

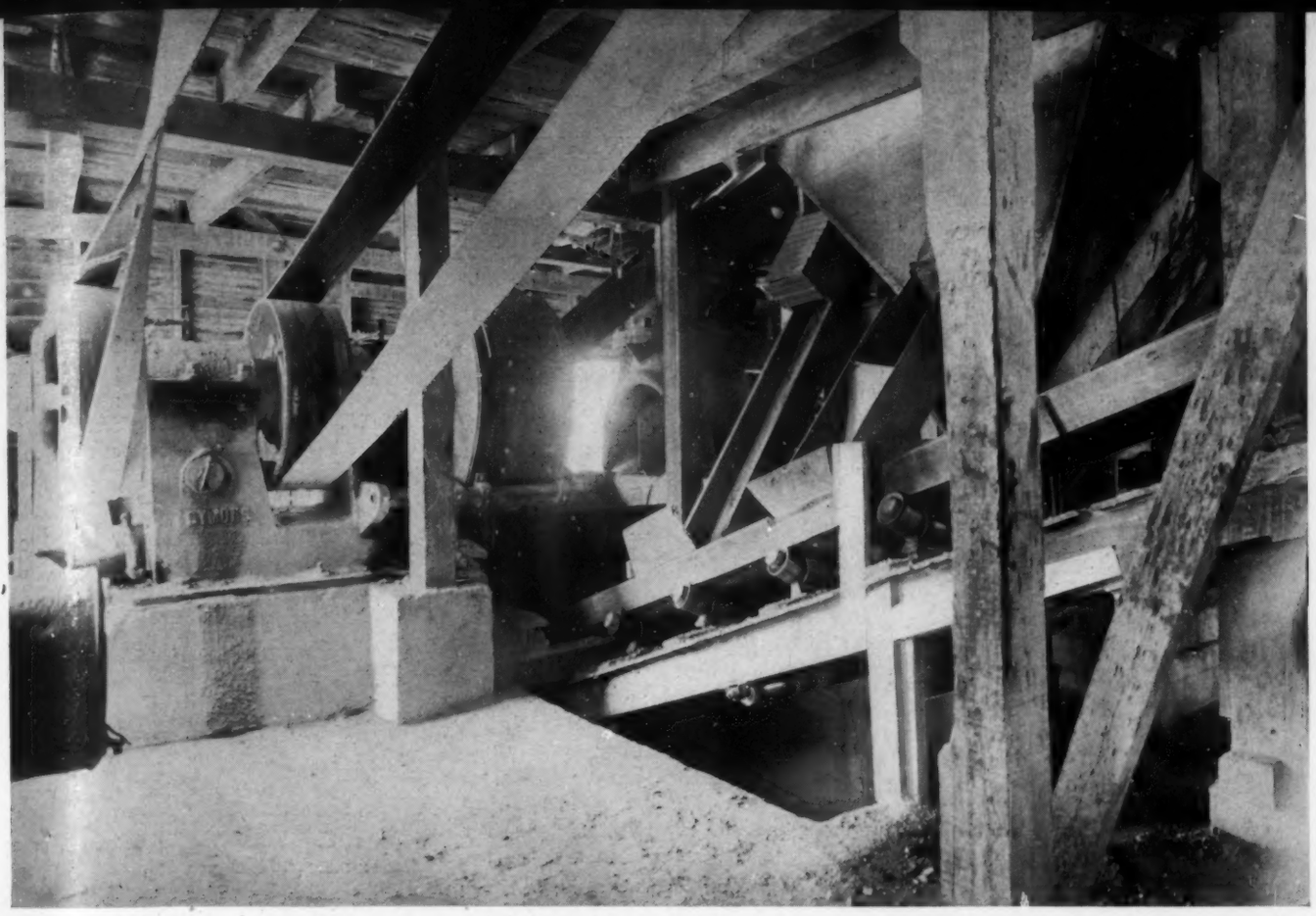
Conveyor leads from crusher house at right to washing plant at left



Crushing Plant—Crushers Picked for Special Work

The car discharges on a grizzly of inverted standard gauge rails, with 6-in. openings. Directly below is a hopper of 1½-car capacity, which discharges to a 24-in. Stearns

Above: Lower end of belt taking material from field hopper. Below: Locomotive and loaded car approaching unloading hopper and grizzly



Crushers, and screen discharge chutes to belt conveyor, in the crushing plant

belt conveyor. A feeder connected by chain to the tail pulley regulates the flow from hopper to belt. The material passes up this conveyor, which has 115-ft. centers, to the crusher house, which contains two crushers and a scalping screen. The conveyor discharges directly into a 4x13½-ft. revolving scalping screen manufactured by the Welch Engineering Co. Gravel retained on the barrel of the screen, which has 2½-in. round holes, passes to an Allis-Chalmers Gates "D" No. 4916 gyratory crusher on the floor level below. Gravel between 2 and 2½ in., that passing the screen jacket, goes to a Symons 36-in. disc crusher below. Material

Sand drag discharges through floor to sand silos underneath: Small trough alongside chute loads bin below

passing both screens goes by chute directly to a belt to be carried to the screening plant. A 150-hp. G.-E. induction motor, operating at 870 r.p.m., drives the conveyor from the grizzly to the scalping screen and both crushers through an 18-in. belt from a main overhead shaft.

Midway between the crusher house and the grizzly is a small structure consisting of a Simplicity double-deck 3x6-ft. vibrating screen driven by a 3-hp. G.-E. motor, and two small bins below for loading trucks. A 24-in. belt, 87-ft. centers, takes the gravel, after crushing, from both crushers to this unit, where it passes over the Simplicity screen when crushed road material is being run. The gravel is washed on this screen by 2-in. pipe with perforations before it passes to the bins below.

When this road material is not being run, a chute "cuts out" the screen, and the crushed gravel goes directly to the small bins, where another chute takes it to the belt from the grizzly to the scalping screen to be rescalped.

Screening Plant—Rotaries for Scrubbing

A 24-in. Stearns belt conveyor, 196-ft. centers, driven by a 40-hp. Allis-Chalmers motor through a 12-in. belt, carries the crushed material to the screening plant, where it discharges into a 5x30-ft. revolving screen equipped with three jackets. This screen, manufactured by the Welch Engineering Co., is driven by a 40-hp. G.-E. motor. Wash water for the plant is supplied by a 6-in. centrifugal Allis-Chalmers pump driven by a 40-hp. Northwestern motor through a direct drive. A 4-in. Union centrifugal pump, driven by a 5-hp. Allis-Chalmers motor by a 6-in. belt, is used for priming the 6-in. pump and to supply wash water for the Simplicity screen when running on crushed stone. The 6-in. pump supplies 1000 g.p.m. A 4-in. perforated pipe washes the sand and gravel as it passes through the rotary sizing screen.

Material from ⅜-in. down passes to a Gilbert conical screen 6 ft. long with 4-ft. and 5½-ft. end diameters. Pea gravel (3/16 to ⅜-in.) is separated out here. The 3/16-in. sand passes to a 30-ft. sand drag with 4½-in. blades manufactured by the Welch Engineering Co. A 40-hp. G.-E. motor drives both the Gilbert screen and sand drag. This sand is dragged to its proper concrete storage silo, and a chute is also provided so that small auxiliary bins below can be filled.

Storage—Belt in Tunnel in Spite of Wet and Cold Climate

Four concrete bins, of 400-yd. capacity each, are provided for storage. Each bin has a diameter of 25 ft. and is 30 ft. high. Chutes on the east side of the bins are used for truck-loading, and chutes and auxiliary bins are similarly used on the west side. Taking advantage of its conspicuous location, the name of the plant is painted on these concrete bins—good advertising that too many producers overlook!

Car Loading—Long Belt Conveyors for Finished Products

The plant and pit being located on the east side of the Chicago drive with the Pere Marquette Railroad on the opposite side presented a problem in getting aggregate to the cars. The problem was solved by tunneling under the highway right-of-way and then running a belt conveyor through the tunnel.

A 30-in. belt, 105-ft. centers, driven by a 10-hp. G.-E. motor, passes under the four concrete bins through a concrete tunnel 7 ft. wide and 7 ft. high, where the size or sizes to be shipped by railroad are released by hand gates on the belt. A transfer of belts is made at the head end of this conveyor, after dewatering takes place over a 5x3-ft. stationary screen with ¼-in. perforations at the discharge end of the belt.

The dewatered material is carried by a Stearns 30-in. belt conveyor, 316 ft. centers, through the tunnel under Chicago drive to the railroad siding. This tunnel is also 7 ft. wide by 7 ft. high by 114 ft. long. Another transfer is made at the head end of this conveyor to a 30-in. Stephens-Adamson belt conveyor, driven by a 15-hp. G.-E. motor, running parallel to the tracks up to the car loading bins. These are three bins, each of 35-yd. capacity, feeding directly to the cars.

The capacity of the plant is 100 cu. yd. of gravel an hour. The car-loading belts are capable of loading five cars in an hour. At the present time the company is shipping 15 cars daily for use on a 15-mile paving job 20 ft. wide; and a large railroad ballast order is soon to be filled. Gravel from stock pile is loaded into trucks by a Bay City 1-yd. electric clam-shell crane operating with a 30-ft. boom.

Gold in Them Thar Sands!

Los Angeles Rock and Gravel Co. property in Marble canyon, near Big Pine, Calif., is being mined for placer gold. One shaft has been sunk and three more are in progress.

Raised Sunken River Dredge

Knoxville Sangravl Material Co., Knoxville, Tenn., succeeded in raising its $35,000 No. 4 dredge which sank in French Broad river the latter part of January. Damage was slight.

Prices Bid—Contracts Let

Parker Dam, Colorado River, Calif., contract for 35,000 bbl. of cement went to Monolith Portland Cement Co., Los Angeles, Calif., for $69,790 delivered, or approximately $1.99 per bbl.

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Elyria, Ohio: County commissioners purchased 6815 tons of crushed slag from National Tube Co. at $1.40 per ton.

• • •

Steubenville, Ohio: Contract for waterworks lime let to Marble Cliff Quarries Co., Columbus, Ohio, at following prices bid: 25-ton carload lots, $10.35 per ton; 15-ton carload lots, $10.89 per ton; 10-ton truck-load lots, $10.60 per ton.

• • •

Ocean City, N. J.: City let contract for 21,000 cu. yd. of gravel to John Pelts at 32.9c per cu. yd.

• • •

Burlington, Wis.: Contractors in Walworth county employing WPA labor have reduced the price of agricultural limestone from $1.40 per ton to $1.00 per ton, with free delivery within a radius of 7 miles; 7-14 miles, $1.20; over 14 miles, $1.40.

• • •

Green Bay, Wis.: Contractors employing WPA labor in Brown county have made a price of 80c per ton at the quarry for agricultural limestone.

General view of screening plant and silos of Wm. J. Breen Gravel Co.; Crushing unit is to the left of the silos

Cement Comparisons

STANDARD STATISTICS CO., New York City, in a copyrighted bulletin, "Standard Trade and Securities," issued January 1, 1936, gives some interesting comparisons of operating income and apparent operating efficiency of four of the larger cement companies. The article is headed "Serious Overcapacity Threatens Cement Profits." The accompanying table gives comparisons of net sales, operating income and net income over a period of 10 years, in percentages based on 100 for the year 1928:

OPERATING COMPARISONS
—Per Barrel of Plant Capacity—

		Net Plant	Net Sales	Operat. Before Depr.	Profit After Depr.	% Depr. to Gross Plant
Alpha Portland	1934	$1.30	$0.36	$0.08	d$0.02	51.5
	1928	1.80	1.08	0.32	0.22	30.3
International Cement	1934	1.50	0.57	0.21	0.09	44.1
	1928	2.10	1.38	0.43	0.31	23.2
Lehigh Portland*	1934	0.92	0.38	0.09	0.02	50.0
	1928	1.30	1.01	0.28	0.18	35.1
Penn.-Dixie	1934	1.64	0.38	0.02	d0.01	46.6
	1928	2.42	1.03	0.33	0.20	23.4

d Deficit. *Plant account excludes mineral deposits.

OPERATING COMPARISONS—CEMENT MANUFACTURERS

	Net Sales 1928=100					Operating Income 1928=100					Net Income 1928=100				
	Composite	Alpha Portland	International Cement	Lehigh Portland	Penn.-Dixie	Composite	Alpha Portland	International Cement	Lehigh Portland	§Penn.-Dixie	Composite	Alpha Portland	International Cement	Lehigh Portland	Penn.-Dixie
1934	41.6	35.6	49.5	40.3	40.9	40.9	37.7	56.8	35.1	34.0	d6.6	d6.2	13.0	20.6	d53.6
1933	30.2	30.0	39.3	27.5	24.1	20.0	17.6	43.7	10.9	7.7	d45.5	d23.4	d8.8	d20.5	d129.4
1932	31.7	28.5	40.2	27.2	30.7	3.9	d10.5	31.5	d8.2	2.9	d71.6	d68.2	d25.5	d48.4	d144.2
1931	55.9	44.4	72.8	52.3	54.0	28.9	10.1	63.6	23.6	18.3	d31.2	d30.2	8.6	1.9	d105.0
1930	79.7	73.4	98.0	71.1	76.2	76.8	65.2	107.0	59.2	75.7	54.6	48.3	73.6	51.0	45.4
1929	88.0	84.0	102.9	82.4	84.7	80.2	77.0	104.5	70.4	69.0	64.3	70.2	94.8	66.4	25.7
1928	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1927	102.5	99.8	85.8	117.6	106.8	99.4	93.7	82.7	102.7	118.3	107.9	91.2	88.4	99.8	152.2
1926	108.4	95.7	78.4	129.6	‡129.7	119.9	98.8	78.7	130.5	‡171.5	151.9	100.5	84.6	127.1	‡295.2
1925	100.3	114.1	64.2	....	‡122.5	118.8	133.2	65.6	....	‡157.5	113.3	149.3	77.2	....	....
Avg	73.8	70.6	73.1	72.0	87.0	68.9	62.3	73.4	58.0	75.5	43.7	43.2	50.6	44.2	19.6

	—% Operating Income to Sales—					% Net Income to Sales and Other Income					% Net Inc. to *Net Plant and Fixed Investments				
	Composite	Alpha Portland	International Cement	Lehigh Portland	Penn.-Dixie	Composite	Alpha Portland	International Cement	Lehigh Portland	§Penn.-Dixie	Composite	Alpha Portland	International Cement	Lehigh Portland	Penn.-Dixie
1934	29.5	31.6	35.7	24.3	26.5	d1.1	d3.1	4.8	8.7	d14.8	0.1	d0.9	1.6	2.8	d3.3
1933	18.1	17.4	34.6	10.1	10.2	d24.1	d14.4	d4.1	d12.6	d61.2	d3.6	d3.2	d1.1	d2.6	d7.6
1932	2.0	d10.9	24.3	d8.4	3.1	d34.9	d44.7	d11.7	d24.6	d53.7	d6.4	d8.7	d3.1	d5.8	d8.0
1931	13.2	6.8	27.2	7.9	10.8	d7.9	d12.5	2.4	0.6	d22.2	d2.0	d3.7	1.1	0.2	d5.5
1930	28.3	26.4	33.9	23.2	31.5	10.8	12.3	11.8	12.2	6.8	5.7	5.6	8.7	6.0	2.3
1929	30.3	27.3	31.6	23.8	38.5	12.4	15.5	17.0	13.6	3.5	7.2	8.0	11.6	7.7	1.3
1928	30.0	29.6	31.1	27.9	31.3	16.5	18.8	18.4	17.2	11.4	11.2	13.5	15.3	11.1	4.9
1927	27.6	27.9	30.0	24.3	28.3	16.8	17.3	19.0	14.8	16.2	11.4	12.0	14.8	11.3	7.5
1926	28.4	30.7	31.2	28.1	‡23.7	20.8	†20.1	20.0	17.1	‡25.9	15.4	15.3	15.5	....	....
1925	30.3	34.7	31.8	....	‡24.4	22.7	†25.0	22.3	....	....	25.3	23.7	26.9	....	....
Avg	23.8	22.2	31.1	18.0	22.8	3.2	3.4	10.0	5.2	d9.8	6.4	6.2	9.1	3.8	d0.9

*At beginning of year. †Based on sales only. ‡On combined companies prior to formation of present company. §Operating income includes other income not separately reported. Sales exclude other income not separately reported. d Deficit.

The smaller table was compiled to show the relative efficiency of operation of the various companies; it is explained that profits do not differ exactly in proportion with sales volume; the table shows differences in operating ratios, and dissimilarities in capital structure are reflected in the ratios of net income to sales.

New Sales Manager

Wolverine Portland Cement Co., Coldwater, Mich., announces the appointment of J. L. Nelson as general sales manager, succeeding the late Frank C. Mooney. Mr. Nelson until recently was with the Universal Atlas Cement Co., at Chicago.

New Sales Manager

Washington-Idaho Lime Products Co., Orofino, Idaho, is marketing its cement under the brand "Orofino." I. G. Kjosness, formerly with the Madison Lumber & Mill Co., Lewiston, Idaho, and a past-president of the Western Retail Lumberman's Association, has been made sales manager.

New District Office

Portland Cement Association, Chicago, Ill., has established a district office at Birmingham, Ala., in charge of F. M. Chapman, Jr. For the past four years he was a field engineer for the association in Mississippi. The Birmingham office serves the states of Alabama, Louisiana, Mississippi and Tennessee.

New Superintendent

Universal Atlas Cement Co., Chicago, Ill., announces the appointment of L. M. Funderburg as superintendent of its Leeds, Ala., plant. He succeeds the late B. E. Merrell, who died March 4. Mr. Funderburg has been with the company 12 years, and has been assistant plant superintendent at Leeds for six years.

New Plant

Somers Cement Products Co., Vidalia, Ga., and the **Wadley Cement Pipe Co.,** Wadley, Ga., have joined to build a pipe plant at Vidalia. C. C. Somers is in charge.

Portland Cement Pavement Yardage

AWARDS of concrete pavement for February, 1936, were announced by the Portland Cement Association as follows:

	Sq. yd. awarded during February, 1936	Total Sq. yd. for year to date, Feb. 29, 1936
Roads	1,395,749	2,612,314
Streets	659,076	1,666,974
Alleys	13,481	39,396
	2,068,306	4,318,684

New Diesel Power Plant

Southwestern Portland Cement Co., Los Angeles, Calif., according to Toledo, Ohio, news reports, has purchased a twin set of Rathbun-Jones Diesel engines totaling 2000 hp. for its El Paso, Tex., plant.

Increases Storage

Superior Portland Cement, Inc., Seattle, Wash., has started construction of four new reinforced concrete silos at its Concrete, Wash., plant, giving when completed about 100,000 bbl. more storage capacity.

A new service building for employes, combining a hospital, commissary, wash rooms, locker rooms and a recreation room, recently was completed by the Missouri Portland Cement Co. at its Cement City plant, north of Independence, Mo. The structure is 135 by 35 ft.

Rock Wool from Wollastonite by Electric Furnace

WOLLASTONITE is of interest to rock products producers as the most important calcium silicate in nature. Since calcium silicate is the principal constituent of portland cement, after it has set, its properties are interesting. It is relatively rare. There is a deposit, discovered seven years ago, in Kern county, California, estimated to contain 12,000,000 tons. John T. Thorndyke, mining engineer, Glendale, Calif., describes this deposit and its possibilities for manufacture of rock wool in *Mining and Metallurgy*, March, 1936.

The following is an average analysis:

	Per Cent
Silica (SiO_2)	47.12
Lime (CaO)	41.72
Magnesia (MgO)	2.72
Alkalies (R_2O)	Trace
Iron (Fe_2O_3)	1.60

Using wollastonite as the raw material for rock wool and accepted processes of manufacture, a study was made as to the controlling influence of color and length and quality of fiber and the melting means. Gas, coal, coke, and coke and wood firing were tried, as is the proper practice where the cupola type of furnace is used, but they were all found to be unsatisfactory where the raw material used was wollastonite. Wollastonite has a tendency to build up and almost instantaneously freeze when coming in contact with air at the discharge nozzle of a cupola furnace. Increasing the temperature at which the fluid mass was blown into wool, and still using the cupola type of furnace, was found unsatisfactory. But with the electric arc furnace, and a simple charge of wollastonite the resultant wool was snow white and extremely long fibered with almost a total absence of shot glass and non-fibrous material. This result, however, was not attained until a method was perfected of preventing minute particles of carbon from parting from the crayons and dropping into the charge; these minute particles of carbon caused a slight tinge of gray to be imparted to the wool.

The mineral wool so prepared from wollastonite, using the electric arc furnace, was found, on comparison with recognized products, to be highly superior, having a uniformity of color and fiber, being substantially free of nonfibrous contamination, and being capable of maintaining its physical form in handling. Furthermore, a wool made from such raw material is of a novel chemical composition. There is a substantial absence of aluminum compounds, heretofore considered as an essential constituent of a satisfactory wool by some manufacturers, alumina being added to the charge of raw materials in the form of a clay. Wool prepared from wollastonite is unique in containing substantially equal molecular proportions of calcium oxide and silicon dioxide. The calcium oxide in the product is in general between 40 and 45% and that of silicon dioxide between 45 and 50%, the total being seldom less than 90%. The following chemical analysis is typical:

	%		%
SiO_2	49.20	MgO	2.62
Fe_2O_3	0.64	K_2O	0.20
Al_2O_3	2.64	Na_2O	0.50
CaO	44.30	Mn_2O_3	0.04
		Total	99.96

For some unknown reason, this wool had a higher melting point and was more resistant to the attacks of acids than wool produced from charges heretofore enumerated.

Relieves Unemployment

Quartzite Stone Co., Lincoln, Kan., starting up its operation after a two-months' shutdown has reduced the county's unemployed relief list from 35 to 1.

Incorporate—New Manager

Pennsylvania Stone Producers' Association met in Harrisburg, Penn., February 19 and 20 and voted to incorporate and to employ a full-time general manager. H. H. Wagner is the man slated and his offices are at 235 State St., Harrisburg. The association elected W. W. Duff, New Castle Lime & Stone Co., New Castle, president; C. C. Hartsook, Lime Bluff Co., Muncy, vice-president; J. R. Chamberlin, the Mann Co., Norristown, secretary-treasurer.

Other business of the meeting included extemporaneous addresses by Otho M. Graves, chairman of the [now late] Mineral Aggregates Institute, A. T. Goldbeck, engineering director, National Crushed Stone Association, and J. R. Boyd, its executive director.

Resuming Activity

Brookhaven Gravel Co., Crystal Springs, Miss., under the management of T. W. Maddux, is rebuilding and repairing its plant, which has not operated since 1928, in anticipation of the large state highway building program. **Central Mississippi Gravel Co.**, owned by the Birmingham Slag Co. interests, is also starting operation of its Crystal Springs plant.

Ask Dredging Permit

Iron City Sand and Gravel Co., Pittsburgh, Penn., has asked permission of the U. S. War Department to dredge sand and gravel from the Ohio River between Dam No. 8 at East Liverpool and Pittsburgh, in the Allegheny River to Lock No. 8 at Mosgrove, Penn., and in the Monongahela River from the mouth to 25th St., Pittsburgh. This constitutes one of the largest dredging projects proposed.

Receiver Asked For

Ross Island Sand and Gravel Co., Portland, Ore., is being sued for a foreclosure by a local bank. The complaint alleges that $488,100 is outstanding on a first mortgage bond issue of $550,000 and that no interest has been paid since January 1, 1932. A judgment of $624,268 is asked for.

Suspends Production

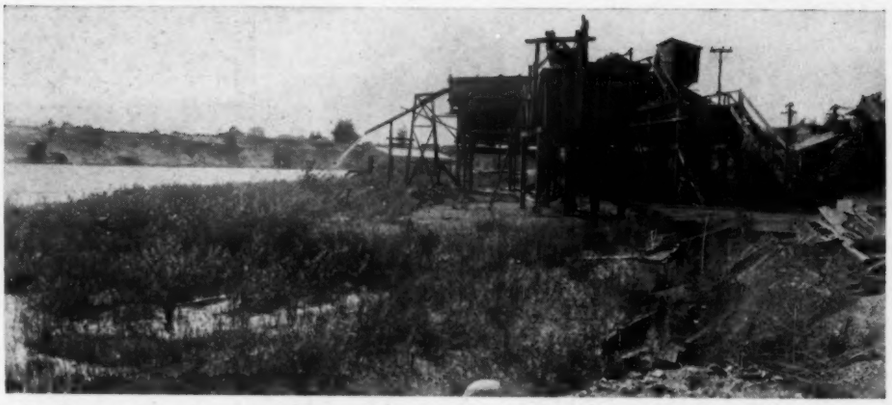
Giant Portland Cement Co., Egypt, Penn., temporarily suspended clinker production on February 15 for several weeks. Storage facilities being full, shipments will be made from stock.

Sales Representative

Consolidated Cement Corp., Chicago, Ill., has appointed John L. Guss, Toledo, Ohio, sales representative in northwestern Ohio, with headquarters at Jackson, Mich.

Rebuilds Gravel Plant

Bentley and Miller Gravel Co. (P. J. Bentley and H. W. Miller), Mt. Morris, Mich., has rebuilt and is now operating the sand and gravel plant formerly operated by the Genesee Gravel Co., of Detroit, Mich. The property was leased on a royalty basis and the plant moved about one-quarter of a mile from its original location. New equipment added included a 3x6-ft. triple-deck Simplicity vibrating screen, a 36-in. Symons disk crusher and a 16x22 Universal jaw crusher. The pit being worked has an average overburden of 5 ft. and is excavated to a depth of 35 ft., where hard pan is encountered. The overburden is not stripped, but is run through the plant and screened and washed out. A gasoline-driven Universal crane with a ½-yd. bucket on a Mack truck loads the material into a 2-yd. truck. The truck discharges into an 8-yd. receiving hopper. The material passes over a single-deck 3x6-ft. Simplicity scalping screen. The rejects go to a Universal jaw crusher, 16x22 in., where everything is crushed to 1½-in. size and down. After passing this crusher, a chute carries the material to a 36-in. Symons disk crusher, which crushes to ¾-in. and down. After passing the Symons crusher, a bucket elevator 21 ft. high elevates the material to the scalping screen again. The throughs go by a chute to a 24-in. conveyor, 75-ft. centers, which discharges in the screening plant on a 3x6-ft. triple-deck Simplicity sizing screen. A 30-hp. International electric motor drives both crushers, the bucket elevator and the scalping screen. A 10-hp. G-E motor drives the triple-deck screen and conveyor. The plant is equipped with two gravel bins, each of 20 cu. yd. capacity, and three sand bins of 8 cu. yd. capacity each. Sand (below 3/16-in.) passes to a wooden settling tank, and the overflow goes by flume back to the pond. An 8-in. pump (American Well Works), driven by a 40-hp. Lincoln motor through a belt connection, supplies wash water from an old pond nearby. A 24-in. belt passes under the bins and the 60-40 material, specified by the state highway department, is proportioned on this belt and carried to a truck-loading hopper. It is driven by a 5-hp. G-E motor.



Rebuilt plant of the Genesee Gravel Co. near Detroit, Mich., now operated by Bentley & Miller Gravel Co.

Operating Data

United States Gypsum Co., Chicago, Ill., through Sewell L. Avery, its president, recently made public some interesting data on operation and sales. Mr. Avery told of further progress in diversification; products such as roofing, paints, metal lath, insulation, acoustical products, lime, etc., accounted for 38% of sales in 1935 and produced 20% of direct profits. The gypsum division operated at about 25% of capacity in 1935. Production costs remained about the same, selling expenses were greater, but the per unit selling cost was 4% lower in 1935 than in 1934. Tonnage volume of sales increased 43% in 1935 over 1934, dollar value of sales increased 40%; profits increased 62%.

Mr. Avery said U. S. G.'s business is different from the ordinary (but like nearly all other rock products enterprises) in that investment in plant and property is relatively high for the volume of sales. It is necessary to have capacity adequate to handle peak seasons in Spring and Fall. To do this, the company's investment is turned over only once in two or three years. At present, the company's investment is turned over, in terms of sales of product, once in three years. In 1935 the net profit was 6.1% on total investment and in 1934 it was 3.8%.

A $25,000,000 Building Project

DALLAS, TEX., has a construction project totaling $25,000,000 in its Texas Centennial Exposition, scheduled to open June 6. Rock products producers are profiting from orders for materials. Following are some of the lucky ones: Blue Diamond Co. (lime putty, etc.), Nolan Browne Co. (concrete products), Dallas Concrete Co. (aggregates and ready-mixed concrete), Lone Star Cement Co., Trinity Portland Cement Co., J. Lee and E. A. Vilbig (aggregates), U. S. Gypsum Co. (stucco, wall board).

New Operation

Tohickton Quarry Co., Weisel, Penn., near Doylestown, is opening a new quarry on the Martzen farm, in preparation of building a crushing plant.

New Plant

Miami Stone Co., Miami, Ohio, has made arrangements to establish a plant on the property of the Pittsburgh Plate Glass Co., East Fultonham, Ohio, to make and market agricultural limestone.

Dinner to Competitors

Neal Gravel Co., Mattoon, Ill., on March 19 gave its annual dinner for competitors. Serving as hosts for the company were B. E. Neal, E. Guy Sutton, P. J. Cantlon, F. P. Steinberg and William E. Laughlin. Producer guests were present from nearby plants in Indiana and Illinois. Each year about this time the Neal Gravel Co. plays host to its competitors.

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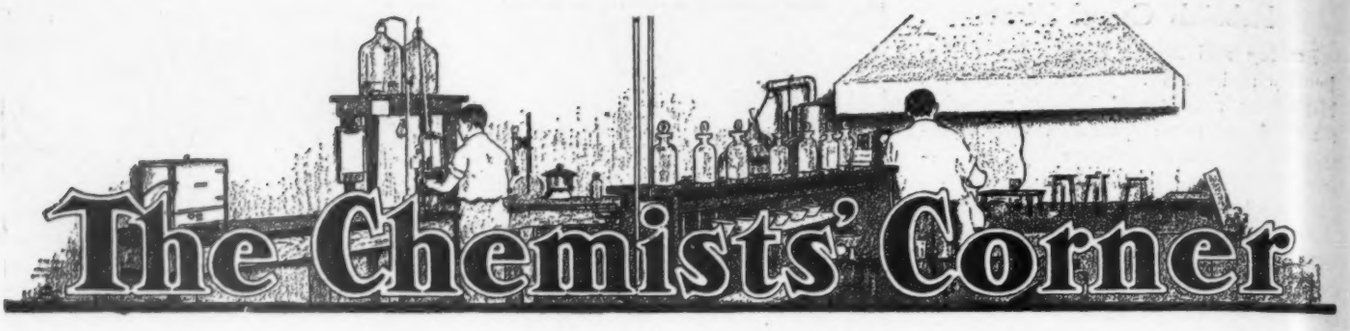


Designing Raw Mix To Produce Clinker of Desired Composition

By W. M. Sweet,
Analyst, Oregon Portland Cement Co., Oswego, Ore.

IN VIEW of the recent trend toward cements of definite compound composition, it is evident that the cement chemist must be able to produce clinker of the desired composition. In any single set of raw materials there is an upper and a lower limit to the possible compositions of clinker—a clinker containing the maximum amount of CaO and one containing the minimum amount of CaO. The present article presents an approximate method of proportioning the raw materials. Too much stress cannot be laid upon the fact that it is absolutely necessary to make the final adjustments in the mix on the basis of an actual run with the plant equipment.

In proportioning the raw materials, it is well to remember that the fewer the number of raw materials used to attain the desired mix the less the chance for error in the mixing. This chance of error not only exists in the possible inaccuracy of mixing during the process of manufacture, but is also accentuated by the variations from time to time in the chemical composition of one or more of the raw materials. These variations are bound to occur to a greater or lesser extent.

The method consists of the following steps, each succeeding step making a correction not taken care of by the preceding steps:

I. Calculation of the maximum and minimum clinkers.

II. Calculation of the mix proportions
- (*a*) On the basis of the C_3S* content, or
- (*b*) On the basis of the C_2S content
- (*c*) On the basis of the C_4AF and C_3A content
- (*d*) On the basis of the impurities in the iron ore

I. Calculation of the Maximum and Minimum Clinkers

In calculating the maximum clinker, use is made of the familiar factors, assuming that the clinker is completely saturated with CaO. T. B. Shertzer made use of this method in an article written for Rock Products in 1930. The factors are those proposed by R. H. Bogue for the oxide combination in portland cement:

$$\frac{\text{CaO deficiency in clay}}{\text{CaO excess in limerock}} = \frac{[2.8\ SiO_2 + 1.4\ Fe_2O_3 + (Al_2O_3 - .64\ Fe_2O_3)\ 1.65 + 0.7\ SO_3] - CaO}{CaO - [2.8\ SiO_2 + 1.4\ Fe_2O_3 + (Al_2O_3 - .64\ Fe_2O_3)\ 1.65 + 0.7\ SO_3]} =$$

parts of limerock required to each part of clay.

In calculating the minimum clinker the method is the same, the only change being in the factor by which the SiO_2 is multiplied. In this case no C_3S is formed, all the SiO_2 being used to form C_2S, and the factor 2.8 is replaced by 1.87.

It is necessary to calculate the two clinkers from the above obtained mix proportions in order to know their compound compositions which are needed to adjust the mix to give the desired clinker. It also gives valuable information as to whether it is possible to prepare the desired clinker with the raw materials at hand. The following example will serve to illustrate this step.

RAW MATERIALS

	Clay	Limerock
SiO_2	62.35	2.50
Fe_2O_3	4.37	0.35
Al_2O_3	16.12	2.10
CaO	2.00	50.28
MgO	1.20	1.50
SO_3	1.70	0.60
Loss	12.26	42.67

Applying the formulas given above, we get 5.1 parts of limerock to each part of clay to obtain the maximum mix, and for the minimum mix 3.4 parts of limerock for each part of clay, giving the following clinkers:

CLINKERS (Calculated)

	Maximum Clinker			Minimum Clinker		
SiO_2	19.76			25.07		
Fe_2O_3	1.62	C_3S	72.4	1.97	C_3S	0
Al_2O_3	7.06	$-C_2S$	2.2	8.22	$-C_2S$	72.0
CaO	67.98	$-C_3A$	16.2	61.19	$-C_3A$	18.3
MgO	2.33	C_4AF	4.9	2.23	C_4AF	6.1
SO_3	1.25			1.32		

The method of R. H. Bogue was used in calculating the compounds.

Suppose it is desired to obtain a clinker of the following compound composition: $C_3S = 46$; $C_2S = 30$; $C_3A = 9$; $C_4AF = 12$. Comparison with compound compositions of the maximum and minimum clinkers gives the following information: that a clinker of the required C_3S and C_2S content can be very closely approached, that the C_3A content will be too high, and that the C_4AF will be too low. It will therefore be necessary to add Fe_2O_3 to the mix.

II. Calculation or Mix Proportions

Before adding the necessary Fe_2O_3 to the mix, it is well to calculate the mix required to give the clinker of the right C_3S and C_2S content. To do this find the difference in the parts of limerock used in the maximum and minimum mixes and multiply this by

$$\frac{\text{Desired } C_3S}{C_3S \text{ in maximum clinker}}.$$

For example:

$$5.1 - 3.4 = 1.7 \text{ and } \frac{46}{72.4} \times 1.7 = 1.0$$

part of limerock to be added to the minimum proportion; 3.4 + 1.0 = 4.4 parts of limerock to each part of clay. Disregard entirely the second decimal place.

If desired, the mix may be proportioned on the basis of the C_2S. To do this, multiply the difference in the parts of limerock used by

$$\frac{\text{Desired } C_2S}{C_2S \text{ in minimum clinker}}; \text{ or } \frac{30}{72} \times 1.7$$

= 0.7 parts of limerock to be subtracted from the maximum proportion; 5.1 — .7 = 4.4 parts of limerock to each part of clay.

Then calculate the resulting clinker and its compound composition:

*Note: $C_3S = 3\ CaO.\ SiO_2$, $C_2S = 2\ CaO.\ SiO_2$, $C_3A = 3\ CaO.\ Al_2O_3$, $C_4AF = 4\ CaO.Al_2O_3.\ Fe_2O_3$.

CLINKER ANALYSES (Calculated)

	1 Clay	4.4 Limerock	Σ	Clinker		
SiO_2	62.35	11.00	73.35	21.57		
Fe_2O_3	4.37	1.54	5.91	1.74	C_3S	46.4
Al_2O_3	16.12	9.24	25.36	7.46	C_2S	27.0
CaO	2.00	221.23	223.23	65.65	C_3A	17.0
MgO	1.20	6.60	7.80	2.29	C_4AF	5.2
SO_3	1.70	2.64	4.34	1.28		
			339.99			

This adjusts the C_3S and C_2S to their approximately desired values, but still leaves the C_3A too high and the C_4AF too low.

The mix is next adjusted with regard to these compounds. Subtract the actual C_4AF from the desired to get the amount of compound necessary to add; 12 — 5.2 = 6.8 C_4AF to be added. This multiplied by the gravimetric factor 0.3286 gives the addition of Fe_2O_3 needed; 6.8 × 0.3286 = 2.23 Fe_2O_3 to be added to that already present, making the total Fe_2O_3 2.23 + 1.74 = 3.97. But this addition lowers the actual percentage of each constituent in the clinker, so it is necessary to recast the Fe_2O_3 and Al_2O_3 in terms of the addition; $\frac{3.97}{102.23}$ = 3.88 actual Fe_2O_3, and $\frac{7.46}{102.23}$ = 7.31 actual Al_2O_3.

But this will still leave the C_3A too high. [7.31 — (0.64 × 3.88)] 2.65 = 12.8 C_3A, and $\frac{12.8 - 9}{2.65}$ = 1.43 Al_2O_3 necessary to be replaced. Since it is impossible with the raw materials under consideration to get all the compounds exactly as desired, it seems best to strike a medium for the values of the C_3A and C_4AF; 1.43 + 2.23 = 3.66 Fe_2O_3 necessary to add for the desired C_3A, and averaging $\frac{2.23 + 3.66}{2}$ = 2.94 Fe_2O_3 to add to avoid extremely high C_3A, which gives a recasted value of $\frac{2.94 + 1.74}{102.94}$ = 4.55 Fe_2O_3.

Using the following ratio of comparison between this value of the recast Fe_2O_3 and that obtained in the 4.4 limerock mix gives the Σ Fe_2O_3 necessary in the raw mix; 1.74 : 5.91 = 4.55 : x. Solving, x = 15.45 Σ Fe_2O_3 necessary in raw mix; 15.45 — 5.91 = 9.54 additional Σ Fe_2O_3 needed. The mix now stands: 4.4 parts of limerock, 1 part of clay, and 1 part of 9.54% Fe_2O_3.

Impurities in Iron Ore

In actual practice the Fe_2O_3 is not added in the pure state as Fe_2O_3, but is added in ore form containing various amounts of impurities, such as SiO_2, Al_2O_3, etc., allowance for which must be made in the mix calculations. The method is exactly the same as before except that the iron ore is included among the raw materials in calculating the maximum and minimum clinkers.

Suppose an ore of the following composition to be used:

SiO_2	20.60
Fe_2O_3	76.27
Al_2O_3	1.57
CaO	0.52
MgO	0.56
Loss	0.53

Since we only need 9.54% Fe_2O_3, the number of parts of this ore required will be $\frac{1}{76.27} = \frac{1}{7.99}$, or approximately ⅛ part. This 9.54 amount of each constituent of the ore is then added to the corresponding value in the clay and the mix adjusted as before.

Applying the formula previously given for the calculation of mix proportions, gives us a maximum mix of 5.4 parts of limerock to 1 part of the mixture (8 parts of clay to 1 part of ore), and a minimum mix of 3.6 parts of limerock to 1 part of the mixture (8 parts of clay to 1 part of the ore). These mixes produce the following clinkers:

CLINKER ANALYSIS (Calculated)

	Maximum			Minimum		
SiO_2	19.14			24.11		
Fe_2O_3	3.85	C_3S	72.0	4.94	C_3S	0
Al_2O_3	6.75	C_2S	0.5	7.79	C_2S	69.2
CaO	66.76	C_3A	11.4	59.72	C_3A	12.5
MgO	2.29	C_4AF	11.9	2.17	C_4AF	14.9
SO_3	1.21			1.26		

Correcting for the desired mix: 5.4 — 3.6 =1.8 difference in limerock proportions in maximum and minimum mixes; $\frac{46}{72} \times 1.8 =$ 1.1 parts of limerock to be added to the minimum proportion; 3.6 + 1.1 = 4.7 parts of limerock to 1 part of the mixture (8 parts of clay to 1 part of ore), giving a clinker of the following composition:

SiO_2	20.74		
Fe_2O_3	4.26	C_3S	48.0
Al_2O_3	7.09	C_2S	23.2
CaO	64.49	C_3A	11.7
MgO	2.25	C_4AF	12.8
SO_3	1.22		

By a further application of these principles it is possible to obtain a clinker of minimum deviation of all the compounds from the desired. Subtracting the obtained C_2S from the desired gives 30.0 — 23.2 = 6.8, and averaging this and subtracting from the obtained C_3S leaves the amount of C_3S to be desired to obtain minimum deviation of all the compounds; $48 - \frac{6.8}{2} = 44.6$ desired C_3S, and $\frac{44.6}{48} \times (4.7 - 3.6) = 1$ part of limerock to be added to the minimum mix proportion, making the final corrected mix 4.6 parts of limerock to 1 part of the mixture (8 parts of clay to 1 part of ore). This gives a clinker of the following composition:

SiO_2	21.00		
Fe_2O_3	4.26	C_3S	44.4
Al_2O_3	7.14	C_2S	26.8
CaO	64.13	C_3A	11.4
MgO	2.25	C_4AF	13.1
SO_3	1.22		

With many raw materials that might be chosen it is impossible to obtain the exact values for all four of the compounds, but certain ones can be obtained at the expense of some of the others. For example, the exact C_3S or the exact C_2S desired could be obtained in the present case, but not both; or, the exact C_3A desired or the exact C_4AF could be obtained, but not both; or, the exact C_2S and C_3A could be obtained at the expense of the C_2S and C_4AF; or, the exact C_3S and C_4AF could be obtained at the expense of the C_2S and C_3A; or, the exact C_2S and C_3A could be obtained at the expense of the C_3S and C_4AF; or, the exact C_2S and C_4AF could be obtained at the expense of the C_3S and C_3A. In the example illustrated it was desired to avoid extremes as much as possible.

It must be remembered that this is a theoretical clinker and is not likely to be attained in plant practice, although it may be closely realized. A trial run is required in order to make the final small adjustments. Mixing errors, draft losses, contamination from coal ash, etc., all tend to affect the final product. Most of these factors are probably of such a nature as usually to produce a clinker of lower C_3S, higher C_2S and higher C_3A than the theoretcial. It is possible that by a comparison of the actual clinker with its corresponding theoretical obtained with the standard plant mix, an idea could be obtained as to the contamination likely to occur in the new mix. But even this would be only approximate, and would have to be worked out finally on the basis of a trial run.

American Managing Director Expands British Company

Alpha Cement, Ltd., London, England, of which A. Y. Gowen (former vice-president of Lehigh Portland Cement Co. at Chicago, Ill.) is managing director, has recently absorbed the Central Portland Cement Co., of Great Britain. The Central company was organized in 1916 and its plant is near Sheffield. Its brands are "Caesar" and "Caesarapid." R. B. Dickinson, formerly vice-president of the Marquette Cement Manufacturing Co., Chicago, is also associated with Alpha Cement, Ltd., in London.

Hints and Helps for Superintendents

Method for Making Beveled Cuts on Round Pipe Spouts

By W. J. Verner, Jr.
Marblehead, Ohio

WHEN INSTALLING round spouts made up of fairly large diameter pipe, it is frequently necessary to cut off the end of the pipe on a bevel where it terminates in intersection with a plane surface, such as the opening in the top, bottom, or side of a bin, as in Fig. 1.

The generally accepted method of determining the outline of a cut of this type is by means of a templet, drawn up for the purpose and cut out of heavy paper, to be wrapped around the pipe in position for marking. To make this templet requires time and patience, and to those unaccustomed to this kind of work there is always the chance for error in projection, with attending loss of time and materials. The outline of the templet changes, of course, with each different size of pipe and angle of slope. A typical example of such a templet is shown in Fig. 2.

A much easier and positive method, used with success in making beveled cuts without the aid of a templet, is shown in Fig. 3. A tub, or any open top receptacle of ample size capable of holding water, is placed against a wall or secured in some other manner to prevent sliding along its base. The end of the pipe to be beveled is placed in the tub, with its end resting on the bottom and against the side as shown in the diagram. The pipe is brought to the proper slope by means of an inclinometer or bevel protractor with a spirit level, or a common carpenter's square and level. The pipe is held securely in this position by a saw-horse or other means. The tub is then slowly filled with water to a height just sufficient to immerse the end of the pipe. If care is exercised in introducing the water, so as not to slosh it around as it approaches the required level, the surface will remain calm and the pipe may then be gently withdrawn upward. The water-level line on the pipe represents the outline of the bevel cut, and should be marked immediately with soapstone or chalk as the guide for cutting or burning. Another method is to drain or syphon the water below the high-level before marking the pipe, or, if preferred, the water-level can be chalked around the pipe while still immersed in the water. If more than one pipe of same diameter and slope is required, or if there is possibility of duplicating or renewing later on, then a templet should be made, as in Fig. 2, by wrapping a piece of heavy paper around the pipe and tracing the outline of the bevel cut thereon. The templet should then be cut along this line and marked plainly with match-marks, outside diameter of pipe, and slope that it makes with the horizontal.

The elliptical hole in the bin-plate with which the spout must coincide is often easier to locate and outline with a templet rather than bringing the pipe itself in contact with the plate for marking, as frequently such openings are located in confined places in which it is difficult to work. A typical example of this templet is shown in Fig. 4, and is readily made by cutting from heavy paper the ellipse formed by tracing around the circumference of the beveled end of the pipe. Centerlines should be drawn on the templet to insure alignment of the long axis with the vertical centerline of the spout.

Bridge Saves Kiln Troubles

By M. Miwa,
Mikawa Cement Co., Tahara, Japan

IN BURNING cement in rotary kilns various fixed indicating instruments are very useful, but unfortunately do not serve every purpose. It may be said still that we cannot make cement without the use of our eyes as a guide to burning. But judgment in kiln control by the use of the eye is not easily acquired; only the kiln burners are really competent.

However, even the most experienced burner has difficulty in detecting a clinker ring in the earliest stages of formation. Thus it grows to a size where it is difficult to remove. So it is desirable to detect the formation of clinker rings in the earliest stages.

With this in mind we built a bridge alongside the kiln as shown in the accompanying sketch. By moving along this bridge we can determine, by the use of an indicating pyrometer, from the radiation of heat from the kiln, just what is taking place in the kiln and where. For example, we can estimate approximate flame temperatures at any point in the kiln length, or the position, shape and approximate dimensions of the clinker ring, if it exists, before it can be seen by the eye of the kiln burner.

Our knowledge of the kiln performance thus gained has enabled us to greatly increase its output, because the burner can go ahead with confidence and without risk of ring trouble. Fuel consumption has been reduced and the life of the kiln lining increased.

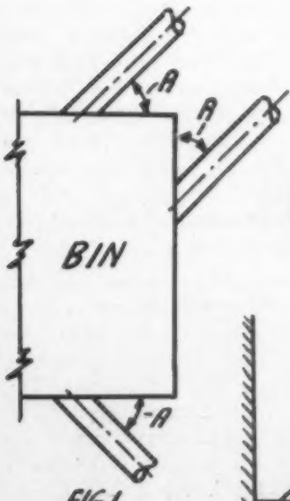


FIG. 1

FIG. 2

Left: Methods of marking beveled cuts on pipe

Below: Bridge alongside of kiln aids in estimating kiln temperature

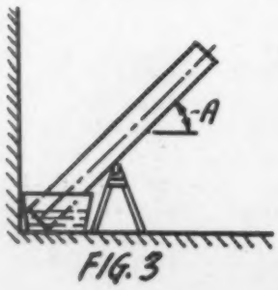
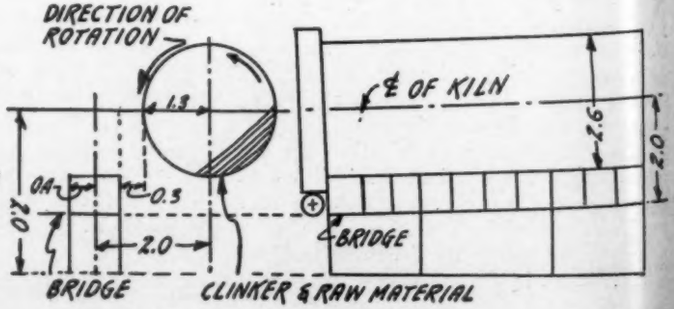


FIG. 3

FIG. 4

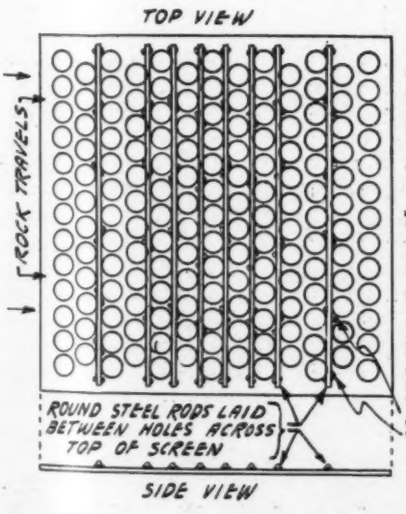


Improvement for Vibrating Screens

By John F. Robertson,
Cedar Bluff Quarry, Princeton, Ky.

THE ACCOMPANYING SKETCH illustrates a development we have made in the use of round perforated screen plates on the vibrating type screens now in general use. This idea is also applicable to wire screen cloth, but to date, we have not used it in this application.

The problem consisted of making six cars of stone from ¼ to 1¼-in. with no tolerance whatsoever on the plus 1¼-in. end of the specification. Using square screens, we would have had to drop to 1-in. or even smaller. We used some old revolving screen sections on the larger sizes, previously, by flattening them and stationing men with paddles to hold the rock back on the screen until it had a chance to screen out. Our first attempt consisted of using the screen, without any holdback for the rock. This was very unsuccessful. We next applied the rods to the screen in the manner illustrated. Five rods, welded on in thirty minutes, improved the screening efficiency 20% —or, to be more exact, it added 20% to the volume of stone that passed the 1¼-in. screen and was retained on the ¼-in. The rod used was some ordinary ¼-in. welding rods.


TOP VIEW
ROCK TRAVELS
ROUND STEEL RODS LAID BETWEEN HOLES ACROSS TOP OF SCREEN
SPOT WELDING AT ABOUT 8" OR 10" INTERVALS
SIDE VIEW

Rods welded to screen improve efficiency

Bin Signal

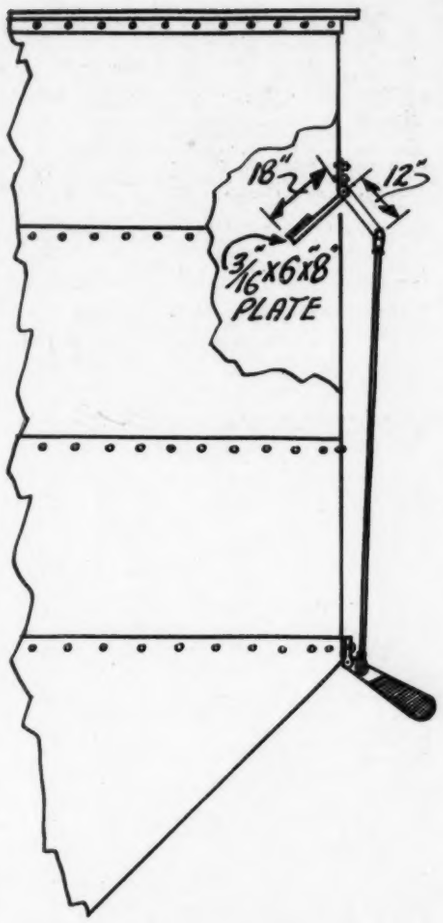
By E. H. McEuen,
Tulare, Calif.

MANY men responsible for the efficient operation of various units in the small plant will recall times when bins have filled up sooner than expected, with the resultant choking up of elevators and conveyors, slipping belts or broken sprocket chains. Such misfortune always means expensive delay as well as extra steps, and heart-breaking and sometimes dangerous labor.

The accompanying sketch illustrates how an ingenious mechanic in a small plant arranged a mechanical signal on a bin to operate a small semaphore on the lower floor when the bin was full. The first step in installing this device was to determine the point on the side of the bin where the contents, which in this case were crushed rock, would fill up to when the peak of the pile had built up to the end of the chute or conveyor discharge that filled the bin.

When the proper location was ascertained, a vertical slot was cut in the bin ⅝ in. wide and 4 in. long. At the top of this slot a hinge made of ½ in. x 1½ in. flat iron was bolted into position as shown. The loop end of this hinge was cut out in the center, leaving a space 9/16 in. wide and deep enough to take the lever as shown. The lever projecting into the tank was made of ½ in. x 1½ in. flat iron, bent to a 90-deg. angle, 18-in. projecting into the bin and 12-in. centers between the center hole and the hole on the outside end. On the inside end of this lever a piece of 3/16-in. plate was bolted in the manner shown, so that the crushed rock moving down the angle of repose would fill up against the plate and force the lever down against the side of the bin. Thus the signal is actuated from the material when the bin is full. All holes were drilled for ½-in. bolts and the vertical rod was ½-in. diameter with the ends fitted with lugs taken from brake rods on an abandoned truck.

The semaphore was made of light metal and pivoted as shown. It will be noted that the space between holes on the semaphore is much less than on the lever at the top, thus providing more vertical movement of the semaphore with less necessary movement of the top lever. Care should be exercised to keep the angle of the plate inside the bin not flatter than 45 deg. and away from the side of the bin at least three times the diameter of the largest pieces of material coming into the tank, when the device is registering empty. Otherwise, pieces of rock are liable to become entangled with the lever and prevent it from working freely. Strange as it may seem, this device works, and the material can be salvaged from most any scrap pile, and the work done by any repairman in the simplest kind of shop.



Mechanical signal operates semaphore when bin is full

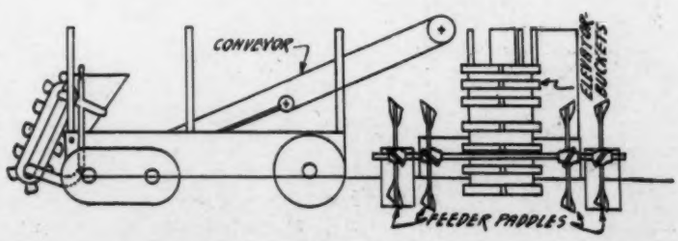
Power Truck Loader

J. L. Hershey,
Piqua, Ohio

HERE is a home-made conveyor loader for loading motor trucks from stock pile, and also for stock piling. This machine was built from an obsolete Koehring No. 10-E concrete mixer by dismantling everything but the gearing and clutches. I mounted an automobile engine in place of the old steam engine.

From an old hand loading conveyor I took the conveyor part and mounted on the old concrete mixer truck. The 10-in. malleable iron conveyor buckets I had, and with these I built a short digging elevator that I mounted on the rear end of the mixer truck, using two 10-in. buckets on a single bar, thus making a 20-in. digging face. This elevator is 6 ft. long (c. to c.) providing sufficient height to dump the material in a short chute which feeds the conveyor belt. On a shaft across the front of the digging elevator are paddles, so arranged as to feed in from both sides.

The total cash outlay for materials and parts, including the motor, was $38.



Home-made conveyor loader

RECENT QUOTATIONS ON ROCK PRODUCTS SECURITIES

Stock	Date	Bid	Asked	Dividend
Allentown P. C., com.[47]	3-26-36	4	6	
Allentown P. C., pfd.[47]	3-26-36	6	8	
Alpha P. C., com.	3-20-36	22½	24	.25 (qu.) Apr. 25
American Aggregates, com.[46]	3-17-36	1	2	
American Aggregates, pfd.[46]	3-17-36	4	8	
American Aggregates, 6's 1st mtg. 3/6's, 1943, new bonds[46]	3-17-36	47	....	
American Aggregates, 6's, 1943, old bonds[46]	3-17-36	47	....	
American L. and S., 1st 7's[46]	3-17-36	98	....	
Arundel Corp., com.	3-24-36	20	actual sale	.25 (qu.) Apr. 1
Ashgrove L. & P. C., com.[47]	3-26-36	13	15	
Ashgrove L. & P. C., pfd.[47]	3-26-36	96	99	
Bessemer L. and C., Class A[46]	3-17-36	5¼	....	
Bessemer L. and C., 1st 6½'s, 1947[46]	3-17-36	75	78	
Bessemer L. and C., cert. of dep., 1947[46]	3-25-36	80	82	
Boston S. and G., com.	3-17-36	1	2	
Boston S. and G., new 7%, pfd.[37]	3-17-36	8	10	
Boston S. and G., 7's, 1939[37]	3-17-36	75	....	
Calaveras Cement, com.[40]	3-24-36	6¾	6¾	
Calaveras Cement, 7% pfd.[40]	3-13-36	79	82	
California Art Tile, A[9]	3-16-36	15	16	
California Art Tile, B[9]	3-16-36	3	3½	
Canada Cement, com.[42]	3-17-36	6½	6¾	
Canada Cement, pfd.[42]	3-17-36	64	66	
Canada Cement, 5½'s, 1947[42]	3-17-36	105	106½	
Canada Crushed Stone, 6½'s, 1944[42]	3-17-36	92	....	
Certainteed Products, com.	3-20-36	16¾	17⅝	
Certainteed Products, pfd.	3-20-36	88½	90	
Certainteed Products, 5½'s, A, 1948	3-20-36	96	97½	
Consol. Cement, 1st 6's, 1950[47]	3-26-36	83	85	
Consol. Cement, A[47]	3-26-36	6	7	
Consol. S. and G., pfd.[42]	3-17-36	32	....	
Consol. Rock Products, units[47]	3-26-36	1	1½	
Construction Mat., com.	6-12-35	6c	actual sale†	
Construction Mat., pfd.	6-12-36	12c	actual sale‡	
Consumers Rock & Gravel, 1st mtg. 6½'s, 1948[47]	3-26-36	20	22	
Coosa P. C., 1st 6's[47]	3-26-36	25	30	
Coplay Cement Mfg., pfd.[47]	3-26-36	14	16	
Coplay Cement Mfg., 6's, 1941[47]	3-26-36	70	73	
Cumberland P. C., 7's, 1937[47]	3-26-36	80	85	
Dewey P. C., com.[47]	3-26-36	40	50	
Dolese and Shepard	3-20-36	33	....	
Dufferin Pav. and Cr. Stone, pfd.[42]	3-17-36	72	....	
Federal P. C., 6½'s, 1941[47]	3-26-36	32	36	
Fla. Port. Cement, 6½'s, 1937[46]	3-25-36	100	102	
Fla. Port. Cement, units[47]	3-26-36	18	20	
Giant P. C., com.[47]	3-26-36	3	5	
Giant P. C., pfd.[47]	3-26-36	15	19	
Gyp. Lime & Alabastine, Ltd.	3-24-36	6⅞	actual sale	
Gyp. Lime & Alabastine, 5½'s, 1948[47]	3-26-36	94	97	
Hawkeye P. C., cap.[47]	3-26-36	30	35	
Hercules Cement, com[47]	3-26-36	30	35	
Hercules Cement, pfd.[47]	3-26-36	85	90	
Hermitage Cement, com.[47]	3-26-36	16	20	
Hermitage Cement, pfd.[47]	3-26-36	92	97	
Ideal Cement, com.	3-20-36	58	62	.75 (qu. & ex.) Apr. 1
International Cement, com.	3-20-36	45⅝	46⅜	.37½ (qu.) Mar. 27
International Cement, conv. deb. 4's, 1945	3-20-36	123½	130¾	
Kelley Island L. and T.	3-20-36	23½	25	.20 (qu.) Apr. 1
Ky. Cons. Stone, 6½'s, 1938[47]	3-26-36	15	19	
Ky. Cons. Stone, com.[47]	3-26-36	1	2	
Ky. Cons. Stone, pfd.[47]	3-26-36	3	5	
Ky. Cons. Stone, 1st mtg. 6½'s[46]	3-25-36	16	19	
Ky. Rock Asphalt, 6½'s, 1935[47]	3-26-36	30	40	
Lawrence P. C., 1947	3-26-36	20	22	
Lawrence P. C., 5½'s, 1942[47]	3-26-36	99	101	
Lehigh P. C., com.	3-20-36	18	20	
Lehigh P. C., 7% pfd.	3-20-36	100	102	
Louisville Cement[47]	3-24-36	90	....	
Lyman-Richey 1st 6's, 1935[47]	3-26-36	15	20	
Marbelite Corp., com. (cement pts.)[40]	3-13-36	¼	½	
Marbelite Corp., pfd.[40]	3-13-36	4	4½	
Marblehead Lime, 7's, 1944[14]	3-18-36	96	98	
Marquette Cement, com.[47]	3-26-36	27	30	
Marquette Cement, pfd.[47]	3-26-36	95	98	
Material Service Corp.[47]	3-26-36	6	8	
McCrady-Rodgers, com.[47]	3-26-36	6	8	
McCrady-Rodgers, 7% pfd.[47]	3-26-36	35	40	
Medusa P. C., com.	3-20-36	15	17½	
Medusa P. C., pfd.[47]	3-26-36	50	55	
Michigan L. and C., com.[47]	3-26-36	50	55	
Minnesota Mining & Mfg. Co.	3-20-36	32	actual sale	.22½ (qu.&ex.)Apr.1

RECENT QUOTATIONS ON ROCK PRODUCTS SECURITIES

Stock	Date	Bid	Asked	Dividend
Missouri P. C.	3-24-36	11½	actual sale	
Monarch Cement, com.[47]	3-26-36	95	100	
Monolith P. C., com.[9]	3-16-36	3	3½	
Monolith P. C., 8% pfd.[9]	3-16-36	6¼	6¾	
Monolith P. C., units[47]	3-26-36	14	16¼	
Monolith P. C., 1st mtg. 6's[9]	3-16-36	101	103	
Monolith Portland, Midwest, pfd.[9]	3-16-36	2	2½	
National Gypsum A., com.[47]	3-26-36	60	62	
National Gypsum, pfd.[47]	3-26-36	105	107	1.75 (qu.) Apr. 1
National Gypsum, 6's[47]	3-26-36	105	106	
National L. and S., 6½'s, 1941[47]	3-26-36	55	58	
Nazareth Cement, com.[47]	3-26-36	7	9	
Nazareth Cement, pfd.[47]	3-26-36	60	65	
Newaygo P. C., 7% cum. pfd.[47]	3-26-36	50	60	
New England Lime, units[14]	3-18-36	8	10	
N. Y. Trap Rock, 1st 6's, 1946	3-24-36	89	actual sale	
N. Y. Trap Rock, 6's, stamped, 1946	3-24-36	88¾	actual sale	
N. Y. Trap Rock, 7% pfd.[46]	3-25-36	65	68	
North Amer. Cement, 1st 6½'s, 1953[47]	3-26-36	32	33	
North Amer. Cement, 6½'s, 1943[47]	3-26-36	86	89	
North Amer. Cement, 6½'s, 1940[47]	3-26-36	55	57	
North Amer. Cement, "A," pfd.	3-24-36	2¾	3½	
North Amer. Cement, "B"[47]	3-26-36	5	6	
North Shore Mat. 1st 6's[47]	3-26-36	35	40	
Northwestern Port. Cem. units[9]	3-16-36	49	52	
Northwestern States P. C.[47]	3-26-36	23	26	.40 Apr. 1
Ohio River S. and G., com.	3-24-36	1	....	
Ohio River S. and G., 1st pfd.	3-24-36	60	....	
Ohio River S. and G., 2nd pfd.	3-24-36	3½	5	
Ohio River S. and G., 6's[46]	3-25-36	10	15	
Oregon P. C., com.[47]	3-26-36	3	4	
Oregon P. C., pfd.[47]	3-26-36	75	80	
Oregon P. C., conv. pfd.[47]	3-26-36	30	35	
Pacific Coast Agg., new com.[40]	3-13-36	3	3⅜	
Pacific P. C., com.[40]	3-13-36	4¼	5	
Pacific P. C., pfd.[40]	3-13-36	44	48	
Peerless Cement, com.[47]	3-26-36	1	2	
Peerless Cement, pfd.[47]	3-26-36	4	5	
Penn.-Dixie Cement, com.	3-24-36	10	actual sale	
Penn.-Dixie Cement, pfd. A	3-24-36	45½	actual sale	
Penn.-Dixie Cement, 6's A, 1941	3-24-36	96½	actual sale	
Penn. Glass Sand Corp., com.[47]	3-26-36	15	16	
Penn. Glass Sand Corp., pfd.	3-26-36	113	115	3.50 (qu. & ac.) Apr. 1
Penn. Glass Sand Corp., 6's[47]	3-26-36	103	104	
Petoskey P. C., 6's, 1941[46]	3-17-36	95	....	
Petoskey P. C., 6's, 1935-38[46]	3-17-36	97	....	
Petoskey P. C., com.[46]	3-17-36	3½	....	
Republic P. C., 6's, 1943[47]	3-26-36	95	97	
Riverside Portland Cement, A[9]	3-16-36	13¼	13¾	
Riverside Portland Cement, B[9]	3-16-36	2½	3	
Riverside Portland Cem., pfd.[9]	3-16-36	98	100	
Rockland and Rockport Lime, 1st pfd.[47]	3-26-36	4	6	
Santa Cruz P. C., com.[9]	3-16-36	37	40	
Schumacher Wallboard, com.[9]	3-16-36	4½	5	
Schumacher Wallboard, pfd.[9]	3-16-36	18	20	
Signal Mt. P. C., units[47]	3-26-36	40	45	
Southwestern P. C., units[46]	3-13-36	195	....	
Spokane P. C., units[47]	3-26-36	8	10	
Standard Paving & Mat. (Can.), com.[42]	3-17-36	2¾	2⅞	
Standard Pav. & Mat., pfd.[42]	3-17-36	18	....	
Superior P. C., A[40]	3-13-36	44	46	
Superior P. C., B[40]	3-13-36	12½	14	
Trinity P. C., units[47]	3-26-36	22	25	
U. S. Gypsum, com.	3-24-36	90	actual sale	.25 (qu.) Apr. 1
U. S. Gypsum, pfd.	3-24-36	163½	166	1.75 (qu.) Apr. 1
Volunteer P. C., 1st 7's, 1942[47]	3-26-36	97	100	
Volunteer P. C., com.[47]	3-26-36	3	5	
Vulcanite P. C., com.[47]	3-26-36	5	7	
Vulcanite P. C., 7½'s, 1943[47]	3-26-36	97	100	
Wabash P. C.[47]	3-26-36	8	10	
Warner Co., ww. 1st 6's, 1944[47]	3-26-36	80	81	
Warner Co., com.[47]	3-26-36	4	5	
Warner Co., pfd.[47]	3-26-36	13	15	
Whitehall Cement Mfg., com.[47]	3-26-36	42	45	
Whitehall Cement Mfg., pfd.[47]	3-26-36	65	70	
Wisconsin L. & C., 1st 6's, 1940[47]	3-26-36	65	68	
Wolverine P. C., com.[47]	3-26-36	5	6	
Yosemite P. C., A. com.[40]	3-13-36	5⅛	5½	

Quotations by: [9]A. E. White Co., San Francisco, Calif. [14]The Securities Co. of Milwaukee, Inc., Milwaukee, Wis. [37]Wise, Hobbs & Seaver, Inc., Boston. [40]Martin Judge, Jr., and Co., San Francisco, Calif. [42]Nesbitt, Thomson & Co., Toronto. [46]First National Bank of Chicago, Chicago, Ill. [47]Anderson Plotz and Co., Chicago, Ill. [48]Hewitt, Ladin & Co., New York, N. Y.

† 60 shares sold at auction, at New York, N. Y.
‡100 shares sold at auction, at New York, N. Y.

Recent Dividends Announced

Minn. Mining & Mfg. (quar.)	$0.17½	Apr. 1. '36
(extra)	.05	Apr. 1, '36
U. S. Gypsum, com. (quar.)	.25	Apr. 1, '36
pfd. (quar.)	1.75	Apr. 1, '36
National Gypsum, 7% 1st pfd. (quar.)	1.75	Apr. 1, '36
5% 2nd pfd. (quar.)	.25	Apr. 1, '36
Ideal Cement, com. (quar.)	.50	Apr. 1, '36
(extra)	.25	Apr. 1, '36
Kelley Island L. & T. (quar.)	.20	Apr. 1, '36
Arundel Corp. (quar.)	.25	Apr. 1, '36
Coronet Phosphate Co., com. (quar.)	1.00	Apr. 1, '36
Northwestern States P. C.	.40	Apr. 1, '36

Consolidated Rock Products Co., Los Angeles, Calif., now in the process of reorganization under 77-B of the Federal Bankruptcy Act, reports for the year ended December 31, 1935, net loss of $512,585 after all charges, including subsidiary bond interest, depreciation, depletion, loss of retirement of capital assets and amortization of bond interest and expense. This compares with a net loss of $575,187 for 1934.

Net loss for the period January 1, 1935, to the date of filing petition for reorganization, May 24, 1935, amounted to $258,923, against net loss of $253,661 for the remainder of the year.

Net sales for 1935 amounted to $1,581,059, as compared with $1,512,481 for 1934. From January 1, 1935, to May 24, 1935, net sales totaled $552,282, and from May 25, 1935, to December 31, 1935, $1,028,777.

Operating profit for 1935 amounted to $49,093, after loss on retirement of capital assets, but before bond interest and reserves for depreciation, depletion and amortization. This compares with operating profit of $21,421 for 1934. Operating loss of $27,301 was shown for the period January 1, 1935, to May 24, 1935, as against an operating profit of $76,394 for the rest of the year.

The company shipped 1,110,000 tons of products during 1935, compared with 875,000 tons in 1934, and has a substantial backlog of orders for the coming year, according to the annual report. Two plants which have been inactive for some time are now being placed in operation.

Income account for the years ended December 31 compares as follows:

	1935	1934
Net sales	$1,581,059	$1,512,480
Cost of sales	1,531,830	1,503,637
Gross profit	$ 49,229	$ 8,743
Other income	4,637	12,578
Loss on retirement of capital assets	4,774	.....
Operating profit	49,093	21,421
Interest charges	181,387	181,410
Depreciation, depletion and amortization	380,290	415,198
Net loss	$ 512,585	$ 575,187

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Pennsylvania-Dixie Cement Corp., New York City, and subsidiaries, report for year ended December 31, 1935, a profit of $1,114,599 before depreciation, depletion and interest, comparing with profit of $1,227,634 in 1934. After provision for depreciation, depletion and interest there was a net loss for the year 1935 of $796,880 against net loss of $691,920 in preceding year.

On December 15, 1935, dividends in arrears on Series A 7% preferred stock amounted to $43.75 per share or $5,302,500 on shares of such stock then outstanding in hands of the public.

Current assets as of December 31, 1935, including $2,303,120 cash, amounted to $4,272,252 and current liabilities were $356,839, compared with cash of $2,604,086, current assets of $4,337,387 and current liabilities of $346,544 at end of preceding year. Inventories were $1,680,774 against $1,558,677.

Consolidated income account for year 1935 compares as follows:

	1935	1934
Sales, less cash discount and allowance	$5,024,800	$4,642,338
Cost of sales	2,346,303	1,958,279
Expenses	1,129,384	1,041,947
Maintenance and repairs	347,541	276,900
Depreciation and depletion	1,375,735	1,355,578
Ordinary taxes	148,876	138,894
Provision for doubtful notes and accounts receivable	2,108	31,173
Loss from operations	$ 325,147	$ 160,433
Other income	65,554	37,342
Loss	$ 259,593	$ 123,091
Loss on non-consolidated subsidiaries	1,543	4,853
Interest	535,744	563,976
Net loss	$ 796,880	$ 691,920

In his report to stockholders, Blaine S. Smith said: "Manufacturing costs of cement were higher in 1935 than 1934 in common with the national trend, and our average selling price was less, influenced by considerably lower prices in the New York, Boston, and Miami, Fla., markets due to increased foreign competition.

"Capital expenditures during the year amounted to $164,441.27, and included the installation of air separators in the finishing mill at the Richard City, Tenn., plant, additional equipment for the Des Moines, Iowa, plant quarry, and replacement and elevation of the raw mill roof structure at Plant No. 4 at Nazareth, Penn. The book value of the property eliminated and charged off during the year was $268,580.64, of which $194,544.43 was charged to the depreciation reserve account and there was a reduction of $19,126.55 in the amount of repair parts classified as fixed assets. All of the above results in a net reduction of $123,265.92 in gross fixed assets account.

"Although the total cement consumption of 74,934,000 bbl. in the United States during 1935 was approximately a million barrels less than during the preceding year, our volume of shipments was somewhat greater. More than one-half our increase occurred in the last quarter of the year 1935, and the increased volume, though permitting the operation of only 29% of the capacity of our plants, did provide 144,000 more man-hours of employment than during the previous year.

"Hourly wage rates at our plants and, so far as we are informed, generally throughout the industry were continued at approximately the 1929 peak. The rates and maximum working hours per week, which were put into effect on August 1, 1933, and were later approved by the NRA, have not been changed since the United States Supreme Court's decision in the NIRA case.

"Higher costs of doing business must be expected as the result of increased Federal and State taxes, direct and indirect, and additional expenses due to legislation, such as the Social Security Act and the Guffey Bill, passed at the last session of Congress.

"Construction contracts awarded, totaling nearly 20% more in value in 1935 than in 1934, established the largest annual total since 1931, but the 1935 total was only 30% of the 1925-1929 five-year average. Particularly encouraging is the fact that 45% of the total was privately financed, as compared with 37% the year before. The noteworthy gain was in the residential field, which was nearly double that of the year before. Non-residential work showed an increase of 24%. However, in the field of heavy public works, where, in comparison with other classes of work, a much larger part of the construction dollar goes for cement, awards in 1935 were 7% below those of the year before. Due to this and the fact that awards for all classes of work were heavier in the latter than in the early months of the year, total cement shipments in the United States were less in 1935 than in 1934.

"Since cement use follows award of contracts, sometimes by several months, a large part of the heavier awards in the latter months of 1935 will be reflected in cement shipments during 1936. Housing accommodations in many sections are so far behind the needs and desires of the people that, with increasing business confidence, a steady improvement in this field is indicated; also, there is evidence of more activity in industrial construction. In the field of public works, much depends upon the amount of additional money to be made available from Federal funds and upon the attitude of State governments toward the diversion of gasoline taxes and automobile license fees from the intended purpose of building highways, to general governmental uses."

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Florida Portland Cement Co., Tampa, Fla., reports for the years ended December 3:

	1935	1934
Net sales	$827,102	$1,319,625
*Net income	(d)2,286	289,431
Earned per share, common	(d) 4.70	(d)$0.81

Number of common shares, 75,000.
*After interest, depreciation, federal taxes, etc.

Preferred dividends are in arrears, as of December 31, 1935, $2,950,000. Current assets were $1,160,861, and current liabilities $38,942; of the current assets, $750,377 was cash.

TRAFFIC and TRANSPORTATION

Proposed Rate Changes

THE FOLLOWING are the latest proposed changes in freight rates up to and including the week of March 21:

Trunk

34355 (Sup. 1). **Furnace limestone,** in open top equipment, C. L., (See Note 2), from York, Thomasville and Bittinger, Penn., to Luke, Md., and Piedmont, W. Va., $1.20 per net ton.

Sup. 1 to 34425. Cancel as obsolete commodity rate on **silica sand, crude or ground flint, flint rock,** etc., shown in W. Md. Ry. I. C. C. Nos. 8137 and 7937, from Baltimore, Md., to various destinations.

Sup. 1 to 34431 **(A) Sand** (other than ground or pulverized or naturally bonded moulding) and **gravel,** in open top cars, without tarpaulin, **(B) sand** (other than ground or pulverized), in closed cars; **sand,** naturally bonded moulding, in open or closed cars (See Note 2) from Buffalo stations, N. Y.

Destinations	(A)	(B)
Erie, Penn.	120	140
Olean, N. Y.	100	120
Arcade, N. Y.	70	100
Nunda, N. Y.	110	140
Mt. Morris, N. Y.	110	140
Rochester, N. Y.	110	140
Bradford, Penn.	100	130
Mayville, N. Y.	90	120
Sherman, N. Y.	90	130

Rates in cents per net ton for P. R. R. delivery only. Cancel all remaining destinations from Buffalo stations, N. Y., with the exception of Williamsport, Penn., and Portageville, N. Y.

34483. **Refuse fuller's earth,** C. L., (See Note 2), from Philadelphia, Penn., to Snow Hill, Md., $1.70 per net ton, plus emergency charge. Proposed rate is comparable with rates to Seitzland and Lebanon, Penn.

Sup. 1 to 34439. To amend minimum weight on rates on **coated crushed stone** from C. & O. Ry. shipping points, Snow Flake, W. Va., Richmond and Norfolk, Va., to (See Note 3), but not less than 60,000 and 80,000 lb. respectively, in closed and open top cars.

34489. (Increase). Cancel rates of $4 per net ton on low grade A **sand and gravel** and $4.30 on high grade B **sand and gravel,** from East Buffalo and Buffalo, N. Y., to Westfield, Mass., sixth class rates to apply.

34497. **Slate,** crushed, dust or ground, C. L., minimum weight 50,000 lb., from Muncy, Penn., to North Brookfield, Mass., 20c per 100 lb., plus emergency charge. Proposed rate comparable with rates from Lenhartsville, Penn., to Nashua, N. H., and Virginville, Penn., to Watertown, Mass.

34512. **(A) Stone, natural** (other than bituminous asphalt rock), crushed, carload; **(B) sand, common or building** (not blast, engine, fire, foundry, glass, molding or silica), carload, and **(B) gravel,** carload (See Note 2), to Croghan, N. Y., from (A)—Watertown, N. Y., $1.10; Prospect Junction, N. Y., $1.10; Newport, N. Y., $1.20. (B)—Boonville, N. Y., $1.00; Alder Creek, N. Y., $1.10; Barneveld, N. Y., $1.10; Forestport, N. Y., $1.10; Utica, N. Y., $1.20, being proposed rates per 2000 lb.

M-3472. **Marble or stone chips or granules; also stone dust,** C. L., minimum weight 50,000 lb., from Whiteford, Cardiff, Md., Delta and Slate Hill, Penn., to Brentwood, Long Island, $4.32 per net ton.

M-3475. **Chert,** C. L. (See Note 3), from Roanoke, Va., to Alexandria, Va., $1.95; Baltimore, Md., Cheriton, Va., $2.15; Ellerson, Va., $1.85; Exmore, Va., $2.25; Harrisonburg, Va., $1.60; Kenbridge, Va., $1.30; Milford, Va., $1.85; Mt. Jackson, Va., $1.65; Norfolk, Va., $1.70; Philadelphia, Penn., $2.55; Staunton, Va., $1.50; Suffolk, Va., $1.60, and Winchester, Va., $1.95 per net ton.

34519. To cancel rates: **Phosphate rock,** crude, C. L., minimum weight 15 net tons—

Between Newport News, Va., Norfolk, Va., Portsmouth, Va., Hopewell, Va., and Petersburg, Va.

Between Monroe, Va., Hampton, Va., Pheobus, Va., and Petersburg, Va.

From Petersburg, Va., Richmond, Va., South Richmond, Va., to Lynchburg, Va.

From Portsmouth, Va., Suffolk, Va., Kilby, Va., to Lynchburg, Va.

34522. **Limestone,** ground or pulverized, and *marl, ground, C. L., minimum weight 60,000 lb., to West Jefferson, N. C., from:

Grove, Md. (Frederick Dist.) basis, 335.

Security, Md., Engle, W. Va., Martinsburg, W. Va., Millville, W. Va., *Natural Lime Marl Co. Sdg., W. Va., *Alba Marl Lime Co., W. Va. (Martinsburg Dist.) basis, 315.

Stephens City, Va., Oranda, Va., Capon Road, Va., Strasburg Jct., Va. (Shenandoah Valley Dist.) basis, 305.

Rates are in cents per 2000 lb. and will be subject to emergency charges.

*Rates applicable on marl only, from stations indicated.

34523. **Stone,** natural (other than bituminous asphalt rock), crushed, with or without coating of oil, tar and/or asphaltum, C. L. (See Note 2), from Jamesville, N. Y., to Windsor, N. Y., $1.40 per net ton.

34524. **Zircon sand (zircon ore), crude,** C. L., minimum weight 56,000 lb. from New York and points within free lighterage limits of New York Harbor to Philadelphia, Penn., and Plymouth Meeting, Penn., 11½c per 100 lb., subject to emergency charge. Proposed rate is comparable with rates from New York, N. Y., to Buffalo, N. Y., and Pittsburgh, Penn., and from Philadelphia, Penn., to Pittsburgh, Penn.

34554. **Crushed stone and screenings,** in straight or mixed carloads (not agricultural or ground limestone, unburnt; nor fluxing stone or firestone; nor stone, coated with oil) (See Note 2), from Blue Mount, Md., to Neubert to Crisfield, Me.; Makemie Park to H. L. Chase, Va., $1.60; Green Bush to Birds Nest, Va., $1.70; Machipongo to Cape Charles, Va., $1.80 and Norfolk Stations, Va., $2 per net ton, plus emergency charge.

34557. **Quarry waste,** (crushed or broken stone, grout and rip rap), C. L., minimum weight 80,000 lb., from South Unadilla, N. Y., to Utica, N. Y., $1.10 per net ton, plus emergency charge.

Central

45884. To establish on **crushed stone** and **crushed stone screenings,** in bulk, in straight or mixed carloads in open top cars, from France Quarries, O., to Silver Creek, Yelverton, Belle Center and Richland, 40c; Huntsville, 50c; Mt. Victory, 40c; Marsh's, 50c; Big Springs, 40c; Rushsylvania, Harper, 50c; Milford Center, New Dover, Carey, Adrian, Berwick, McCutchenville and Landgraf, O., 60c per net ton. Via C. C. C.

45924. To establish on **sand** (except industrial) and **gravel,** in open top cars, C. L., from Elkhart, Ind., to Millersburg, Ligonier, Wawaka, 55c; Brimfield, Kendallville, Corunna, Waterloo, 60c; Butler, 65c; Middlebury, 50c; Shipshewana and Seyberts, Ind., 55c per net ton—Via N. Y. C. R. R. direct.

45932. To establish on **fuller's earth,** C. L., from Olmsted, Ill., to Paulsboro, N. J., minimum weight 40,000 lb., 820c, and minimum weight 70,000 lb., 660c per net ton, plus emergency charge.

45940 (cancels W. D. A. 43738). To establish on **refuse grinding sand,** in box cars, carload, from Toledo, O., to Michigan. Proposed rates in cents per net ton to representative points: Adrian, 105; Alma, 150; Alpena, 180; Bad Axe, 155; Battle Creek, 145; Bay City, 150; Cadillac, 170; Cheboygan, 190; Clare, 155; Deerfield, 95; Detroit, 115; East Jordan, 185; Flint, 140; Frankfort, 185; Gaylord, 180; Grand Haven, 160; Grand Rapids, 155; Grayling, 170; Holland, 160; Homer, 140; Howard City, 160; Ionia, 150; Kalamazoo, 150; Lansing, 140; Ludington, 180; Manistee, 180; Marine City, 145; Mt. Pleasant, 155; Muskegon, 165; Niles, 160; Owosso, 140; Petoskey, 185; Port Huron, 140; Reed City, 165; Saginaw, 145; South Haven, 160; Traverse City, 180; White Cloud, 165.

45956. To establish on (A) **Sand** (except naturally bonded moulding; ground or pulverized, in closed equipment, C. L.; **sand,** naturally bonded moulding, in all kinds of equipment, C. L. (B) **Sand,** ground or pulverized, in all kinds of equipment, C. L. (C) **Sand** (except naturally bonded moulding, ground or pulverized sand), in open top equipment, C. L. (See Note 3); but not less than 60,000 and 80,000 lb., respectively in closed and open top cars from Atlantic, Penn., to points in Illinois, Indiana, Michigan, Ohio and Pennsylvania:

Proposed rates in cents per net ton to representative points:

	A	B	C
Belleville, Ill.	340	374	340
Chicago, Ill.	270	297	270
Danville, Ill.	280	308	280
Quincy, Ill.	350	385	350
Ft. Wayne, Ind.	220	242	215
Indianapolis, Ind.	250	275	250
Marion, Ind.	230	253	220
Albion, Mich.	220	242	215
Battle Creek, Mich.	230	253	230
Detroit, Mich.	210	231	200
Flint, Mich.	230	253	230
Muskegon, Mich.	280	308	280
Akron, O.	130	143	100
Cleveland, O.	140	154	105
Columbus, O.	190	209	170
Dayton, O.	210	231	200
Elyria, O.	150	165	115
Lorain, O.	150	165	115
Painesville, O.	140	154	100
Springfield, O.	200	220	185
Toledo, O.	180	198	145
Youngstown, O.	100	110	80
East Pittsburgh, Penn.	150	165	130
Erie, Penn.	130	143	110
Grove City, Penn.	100	110	90
Kittanning, Penn.	150	165	130
Oil City, Penn.	110	121	80
Pittsburgh, Penn.	140	154	120
Uniontown, Penn.	170	187	150
West Newton, Penn.	160	176	140

45965. (Can. Frt. Assn. File 128)—To establish on **talc or soapstone,** C. L., minimum weight 30,000 lb., from Madoc, Ont., to Chester, W. Va., 36½c. Via all routes.

45975. To cancel rates on **slag** and **slag screenings,** in bulk, from Erie, Penn., to T. L. destinations in Connecticut, Delaware, District of Columbia, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Tennessee, Vermont, Virginia, West Virginia; also Eastern Canada, classification bases to apply in lieu thereof.

46018. To establish on **slag,** crushed, or crushed commercial (not granulated), in open top cars, C. L., from Jackson, O., to B. & O. R. R. Ohio River division in West Virginia, viz., Parkersburg, Belleville, 110c; Polk, Portland, Ravenswood, Willow Grove, New Haven, Point Pleasant, Gallipolis, Glenwood, 120c; Cox Landing Dam, 27, Ohio River, Huntington, Kenova, 130c; Spencer, 200c, and Ripley, 190c per net ton.

46063. To establish on **crushed stone,** C. L., actual weight will apply from Huntington, Ind., to Mentone, Ind., 70c per net ton.

46074. To establish on **agricultural limestone** and **agricultural limestone screenings,** in bulk, in open top cars, C. L., from Gibsonburg and Woodville, O., to points in Ohio, P. S. M. scale 923 for the short line distances, except in a few instances rates exceed this scale.

46075. To establish on **limestone,** ground or pulverized, or limestone, dust, in packages, in box cars, C. L., from Ridgeville, Ind., to points in Indiana, rates as shown:

Anderson, $1.05; Angola, $1.25; Bremen, $1.30; Connersville, $1.20; Cromwell, $1.25; Delphi, $1.26; Goshen, $1.30; Indianapolis, $1.15; La Crosse, $1.30; La Otto, $1.05; La Porte, $1.35; Ligonier, $1.25; Logansport, $1.10; N. Manchester, $1.15; Peru, $1.10; Plymouth, $1.25; South Bend, $1.35; Syracuse, $1.25; Valparaiso, $1.35; Wakarusa, $1.30; Warsaw, $1.25; Wawaka, $1.25; Walcottville, $1.15. Via Penn. R. R.

46091. To establish on (A) **sand,** naturally bonded moulding, in all kinds of equipment, C. L.; sand (except naturally bonded moulding, ground or pulverized sand), in closed equipment, C. L.; (B) **sand, ground or pulverized,** in all kinds of equipment, C. L.; (C) **sand** (except naturally bonded moulding ground or pulverized sand), in open top equipment, C. L. (See Note 3), not less than 60,000 and 80,000 lb., respectively in closed and open top cars from points in the Muskegon, Mich., group to Lancaster, N. Y.: (A) 270c, (B) 297c, and (C) 270c per net ton.

46126. To establish on **crushed stone,** crushed stone screenings, and agricultural limestone, unburnt, in bulk in open-top cars, C. L., from White Sulphur and Scioto, O., to points in Ohio, rates as shown:

B. & O. R. R. Stations: Lester, 105; Chippewa Lake, 115; New Philadelphia, 125; Fairpoint, 135; Martins Ferry, 145; Belmont, 125; Porterfield, 125.

Erie R. R.: Polk, 100; Silver Creek, 115.

N. Y. C. R. R.: Augusta, 135.

Note 1—Minimum weight marked capacity of car.

Note 2—Minimum weight 90% of marked capacity of car.

Note 3—Minimum weight 90% of marked capacity of car, except that when car is loaded to visible capacity the actual weight will apply.

P. R. R.: Toronto, 145; Oneida, 125; Strasburg, 125; Warner, 135; Roseville, 105; New Comerstown, 115; Steubenville, 145.

W. & L. E. R. R.: Massilon, 115; Jewett, 135; Brilliant, 145.

46171, 46229, and 46230. To establish on (A) **sand**, naturally bonded moulding, in all kinds of equipment, C. L.; sand (except naturally bonded moulding; ground or pulverized sand), in closed equipment, C. L.; (B) sand, ground or pulverized, in all kinds of equipment, C. L., and (C) sand (except naturally bonded moulding; ground or pulverized sand), in open top equipment, C. L. (See Note 3), but not less than 60,000 lb. and 80,000 lb., respectively, in closed and open top cars from points in the Muskegon group, viz.: Grand Haven, Muskegon and Rosymound, Mich., to points shown; rates in cents per net ton:

To	A	B	C
Boston, Mass.	445	485	445
Fairfield, Conn.	420	459	420
New York, N. Y.	380	418	380
Plainville, Conn.	415	453	415
Providence, R. I.	465	507	465
St. Johnsbury, Vt.	425	464	425
Seymour, Conn.	425	464	425
Tarrington, Conn.	410	448	410
Westfield, Mass.	415	453	415
Wilmington, Del.	380	418	380

From Evansville Group points to Lyons, Ind., (A) 150c; (B) 165c and (C) 115c.

From Canton, Ohio, Group to Columbia, Penn., (A) 260c; (B) 280c, and (C) 260c.

46200. To establish on **limestone**, agricultural, unburned, in open-top cars, C. L., from Carey, O., to points in Indiana, rates as shown:

To Union City, 115; Muncie, 125; Anderson, 135; Indianapolis, 145; Lynn, 135; New Castle, 145; Granger, 145; Elkhart, 145; New Paris, 145; Warsaw, 155; Bolivar, 155; Marion, 145; Shirley, 135; Knightstown, 145; Letts, 155; Westport, 165; North Vernon, 165; Jeffersonville, 185. Route via C. C. C. & St. L. Ry.

46231. To establish on **crushed stone**, C. L., from Keeport, Ind., to Tipton, Ind., 75c per net ton.

Southern

11026. Establish rates on **feldspar, C. L.**, minimum weight 50,000 lb., from Black Mountain, Bryson and Sylva, N. C., to points in S. W. F. B. territory on basis of 14% of first class.

11059—Establish rate of $1.25 per net ton on **mica refuse, not washed or screened, and mica, scrap, suitable for grinding purposes only**, in straight, or mixed carloads, minimum weight 80,000 lb., from Clinchfield R. R. stations to Biltmore, N. C.

11080. Establish a rate of 200c per net ton on **phosphate rock sinter, C. L.**, minimum weight 40 net tons, from Siglo, Tenn., to Anniston, Ala.

11099. Cancel, as obsolete, rate of 248c per net ton on **phosphate rock, crude or ground, C. L.** (See Note 3), but not less than 60,000 lb., from Charleston, S. C., on import traffic, to Charlotte, N. C., permitting class rate of 19c per 100 lb. to apply.

11158. Establish a rate of 80c per 100 lb. on **mineral wool, plain or saturated**, loose or packages, C. L., min. wt., 24,000 lb., from Rockdale, Tenn., to Denver, Colo.

11180. Establish following rates in cents per gross ton (not subject to emergency charges) on **phosphate rock (other than ground phosphate rock, slush and floats (refuse and washings from phosphate rock), and soft phosphate)**, C. L., min. wt. 80% of marked capacity of car, except that actual weight will govern where cars are loaded to full visible capacity, to Jacksonville, Fla., from Dunnellon, Fla., 202; Felicia, Fla., 215; and A. C. L. R. R. stations, viz., Inverness, Bartow, Morris Mine, Pembroke, Fla., through Jane Jay, Fla.; Tancrede, Fla., through Agricola, Fla.; Standard Mine, Fla., and Ridgewood, Fla., and corresponding stations on the S. A. L. Ry., 224.

11194. Establish rates in cents per net ton on **soapstone and talc**, C. L., from Canton, Jasper, Ga., *Kinsey and *Ranger, N. C., to Lockport and Wilmington, Ill., 600; and from Chatsworth, Ga., to Lockport, Ill., 519. (*Will not apply on soapstone.)

Western

C-41-138. **Limestone**, C. L., from Columbia, Mo., to Clarinda, Red Oak, Ottumwa, Shenandoah, Harlan, Storm Lake and Spencer, Ia. Proposed—Same rate as in effect from Hannibal, Mo.

D-41-139. **Stone**, crushed and/or **marble**, crushed, carload, from Canon City, Colo., and Colorado common points, to Memphis, Tenn. (Group 6). Proposed, $5.75 per net ton, both points. Minimum weight proposed (See Note 2), but in no case less than 50,000 lb.

D-41-140. **Stone**, crushed, C. L., from Spencer, S. D., to Crawford, Neb. Proposed—290c per ton of 2000 lb., not subject to emergency charges.

D-41-141. **Limestone**, crushed or ground, C. L., minimum weight: (a) In open top cars (Note 3), (b) in cars other than open top or tank cars (Note 3), but in no case less than 54,000 lb. from St. Louis, Mo., E. St. Louis, Ill., and Valmeyer, Ill., rates (in cents per ton of 2000 lb.):

To	
Nebraska City, Neb.	252
Omaha, Neb.	252
South Omaha, Neb.	252
Sioux City, Ia.	302
St. Joseph, Mo.	212
Atchison, Kan.	212
Leavenworth, Kan.	212
Council Bluffs, Ia.	252

D-41-142. **Roofing granules** (crushed stone), C. L. (See Note 2), but not less than 80,000 lb. from Wausau, Wis., to Lowell, Ind. Proposed—150c per net ton.

E-41-143. **Sand and gravel**, straight or mixed carloads, from Florena, Kan., to points in Kansas on the U. P. R. R. and Mo. Pac. R. R. To amend Item 35-J, W. T. L. Tariff 210, by providing that shipments of sand and gravel from Florena, Kan., will be subject to same rates as from Irving, Kan.

C-41-144. **Stone**, broken, rip rap and/or rubble, of irregular random widths, lengths and thicknesses, not trimmed or tooled, not suitable for manufacture, cutting or dressing, actual value at origin point, not in excess of $4.50 per ton of 2000 lb. (See Note 3), but not less than 40,000 lb., from Decorah, Iowa, to Chicago, Ill. Proposed—150c per net ton.

C-41-145. **Refuse sand blast dust**, in bags or in bulk in box cars, C. L., from Louisville, Ky., to Kansas City, Mo. Proposed—390c per net ton of 2 000 lb. (not subject to emergency charges), min. wt., 60,000 lb.

E-151-2. **Feldspar**, C. L., from Baileys, Colo., to points in Western Trunk Line territory, also Arkansas, Louisiana, Oklahoma and Texas. Proposed—Same rates as in effect from Buffalo, Colo., to destinations in Western Trunk Line and Southwestern Freight Bureau territories.

E-151-3. **Feldspar**, crude or ground, minimum weight 80,000 lb. to Jackson, Miss. (rates in cents per ton of 2000 lb.). From Colorado points: Boulder, Canon City, Denver, Echo, Feldspar, Golden, Roberts Spur, Spike Buck, Texas Creek, (1) Buffalo, (1) South Platte, (1) Bailey, 800; from Buena Vista, Jefferson, 850. (1) The usual cost of transfer from standard to N. G. cars is to be applied.

Southwestern

7524. **Stone, crushed, ground or broken.** Establish $3.90 per 2000 lb., from Quincy, Ill., to Houston, Tex. (See Note 3.)

7716. **Soapstone, pulverized**, New Orleans, La., ex-Chatsworth, Ga., to Port Arthur and Port Nechez, Tex. Establish rate of 16c per 100 lb., minimum weight 60,000 lb., to expire June 30, 1936.

7753. To establish stopover privilege to partly unload **mineral wool**, plain, saturated or metal reinforced, subject to "SW" and other provisions of Items 660 and 680 of Tariff 174-H.

7781. Establish rates on **stone**, crushed, ground or broken, carload, from Omaha, Neb., to various points in Texas based on the scale in S. W. L. Tariff 162-J.

Texas-Louisiana

7966-3-TX. **Sand and gravel**, carloads, from Hobbs Spur, Texas, to points in Texas other than Belton. Proposition from Hobbs Spur producers to apply the Belton rates as maximum. They feel that they are being discriminated against because in many instances they are denied rates based on the actual distance from Hobbs Spur.

9619-5-TX. **Sand and gravel**, straight or mixed carloads. To establish rate of 85c per ton of 2,000 lb., from Eagle Lake to Virginia Point, Texas. Rate to expire June 30, 1937.

Contract has been let to construct a causeway across Galveston Bay and figures have been submitted covering supplying of material by barge. Railroads believe that to share in this movement they must reduce rates to 85c.

Transcontinental

18078. **Rock wool, C. L., E. B.:** Request for inclusion in section 3, Item 2780, Tariff 3-I, minimum weight 24,000 lb.

Railroads Protest Reduction

The Nebraska state railway commission was notified early in March by five Nebraska railroads that they intend to appeal to the supreme court the commission's order late in February reducing distance and zone rates on sand and gravel shipments. The commission's order covered emergency experimental rates for a year's trial. Rates from Platte river pits to Omaha were reduced from 45c to 35c a ton. Rates from these pits and Fairbury to Lincoln were reduced from 50c to 40c a ton.

I. C. C. Decisions

22109, Sand, Gravel, Crushed Stone, etc., within the state of South Carolina. Supplemental reports. By the Commission. On petition of the Southern Railway Co., orders in prior reports further modified so as to exempt from their provisions the intrastate movement of the commodities mentioned from Wateree River to Charleston, S. C. The exemption was made so as to permit the Southern to make a rate of 95c a net ton in an effort to obtain some of the traffic in material that is being used at the Charleston navy yard, in competition with unregulated carriers by water. Gravel, carloads from Kathwood Pit to Charleston, S. C., was also exempted from provisions of a thirteenth section order.

26829, Lime, Gager Lime Manufacturing Co. vs. Alton et al., and **26845,** Williams Lime Manufacturing Co. vs. Southern et al. By division 4. Rates, lime, Sherwood and Knoxville, Tenn., to all points in Ohio, Indiana, Illinois and West Virginia, found unreasonable for the future to the extent they may exceed rates, 30,000 lb. minimum and rates 80% thereof, minimum 50,000 lb. determined by applying the scales prescribed in lime from, to and between points in the Southwest, 205 I. C. C. 282, less 10%, the resulting figures to be rounded out to the nearest multiple of 5, the net ton being the unit. New rates are to be made effective not later than June 18.

23823, Gypsum Assn. et al. vs. A. T. & S. F. et al.; and **17006,** Upson Co. vs. Ann Arbor et al. The Commission has modified prior reports as to a proposed rate from Fort Dodge, Ia., to Blue Rapids, Kan., on plasterboard. The railroads are now authorized to establish a rate no lower than 17c per 100 lb., minimum weight 80,000 lb., without observing non-prejudicial relations prescribed in previous orders. This is to enable railroads to meet threatened truck competition.

25589, Ohio Lime Manufacturers et al., vs. Pennsylvania et al.; I. and S. **4065,** lime, between eastern trunk line points; and fourth section application **15733,** lime in trunk line and central territories. By division 3. The Commission lays down basis for making of certain rates on lime within trunk line territory and from central territory to trunk line territory. It condemns as impracticable the attempt of carriers to establish rates on fluxing lime, not ground, in bulk, differing from the rates on other sorts of lime. The proceeding had its inception in a complaint which alleged undue prejudice in the rates on lime from points in Ohio to points in trunk line territory as compared with those within the latter territory. That complaint has been dismissed on the ground that the basis approved in the decision will satisfy it.

Lime Producers' Forum

Conducted by Victor J. Azbe,
Consulting Engineer, St. Louis, Mo.

Improving the Direct-Fired Lime Kiln

IT NOW should be quite apparent (if you read and absorbed the first instalment in the March issue) that there are many reasons explaining why direct fired kilns are such poor lime producers and such fuel wasters; and realizing all of these faults, much can be done to correct them. The accompanying sketch shows in a schematic manner the changes recommended that would bring such kiln to such state of modernity without too extensive changes and too great an investment.

The first and simplest step is to close the kiln top, which can best be done by fitting loosely, plates of not too great dimension over flanges of rails or I-beams, as pictured in the sketch. Such loose fitting will allow free expansion and contraction, and the method of allowing the main supporting members to project will create a heat radiating surface that will tend to cool the portion exposed to heat and thus reduce warping.

There should be an opening of ample size to charge the rock which has to be proportioned to the nature of charging equipment. However, after kiln is charged, this opening must be reduced in size so never any air enters and only gases leave. This can be readily seen and accordingly regulated.

Draft Regulation

In the study of this it was developed that draft on natural draft kilns can be regulated, which before was not thought possible. This regulation is possible only on top and by means of the cover over the charging hole. To regulate the draft below is impossible. It should be evident, however, that if nothing could come out on top, nothing could get in below, which is the proper way to seal the kiln. If less lime is needed than normal kiln capacity, that reduction should be obtained by reducing the size of outlet rather than by more wasteful operation of the lime kiln. If there is too much air passing through the kiln for the amount of fuel burned, that can be readily reduced by closing off on the outlet, and this regulation could be made as convenient as any damper regulation. On natural gas fired kiln this scheme was tried and it was a revelation. With this arrangement it is even possible to measure draft and so maintain constant conditions, and a small differential gauge showing a slight pressure under the top would be all that is necessary.

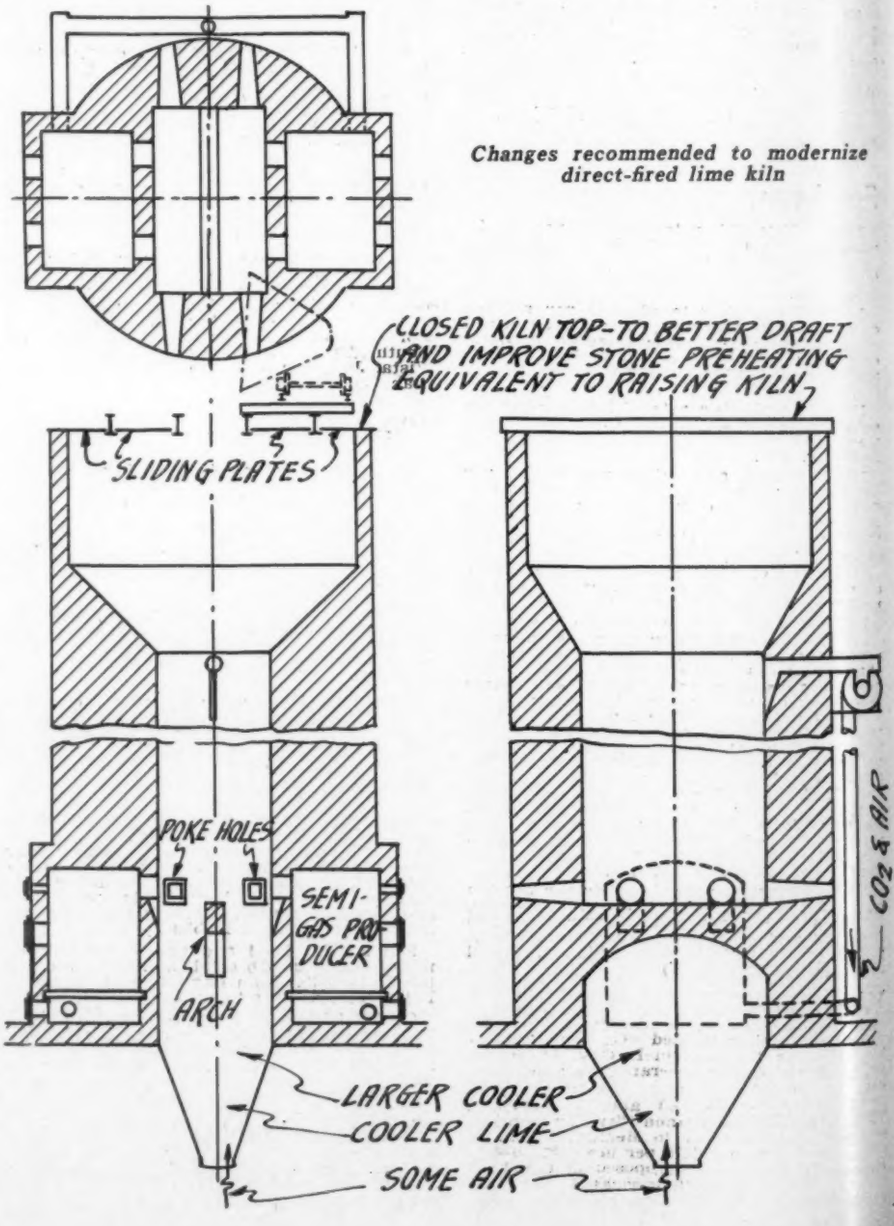
With the top closed, the space below would be uniformly hot and stone would start preheating as soon as charged; and so by closing the top the effect would be that of a larger kiln, better preheating, better draft, more capacity or less fuel, and in addition possibility for control. The gains from closing kiln tops are so many and so great, and the cost so small, that as soon as the advantages are realized, to have an open top kiln would stamp one as a "back number."

But closing the top is not sufficient. The firing method must be improved, also, and here a radical departure is necessary as plain grate firing is impossible of improvement to any satisfactory degree. What is needed is regularity of heat evolution, and if gas from a centralized automatic producer or natural gas is not available, then simple semi-gas producers are about the only solution.

Furnace Operated as Gas Producer

Basically there is not much difference between plain grate firing and simplest producer firing. In the second case the fuel bed is much thicker and the air coming through the grate burns fuel only to carbon monoxide; that is, converts it to a combustible gas. Such a producer is so operated that, at firing, the top of the fuel bed is still comparatively cool, and so the green coal charged does not flash its volatiles immediately, but gives them off at a more constant rate, at a rate that enables them to properly burn.

Gas producers unfortunately must be deep as the fuel should be deep, and then there



Changes recommended to modernize direct-fired lime kiln

should be a fairly high space over the fuel bed, as this space has a chimney effect and puts the producer space under slight but very desirable suction. Without this suction the firing door would leak gas, and at every firing the blast would have to be shut off.

The operating troubles with producers are clinkers. While the top of the bed is comparatively cool, there are sections that are extremely hot, wherein the ash fuses into clinker masses that would be hard to remove under such an arrangement as shown. But recirculation of some CO_2 from the kiln top, mixed with air in such proportions that the CO_2 content of the mixture is about 5 to 7 per cent, definitely prevents clinker formation, after which the ash can be removed as ash through the medium of shaking grates, or grate bars of simpler movable form.

The area of producer bed should be large so the gasification rate will be low, which is conducive to better gas and less clinker trouble. The producers shown are 4 ft. x 6 ft. in dimensions each, or a total surface of 48 sq. ft. With a gasification rate of 10 lb. of coal per square foot, they would produce more than enough gas for 15 tons of lime. The gas generation would, of course, be regulated in accordance with the capacity of the kiln to take the gas, and this by increasing or reducing the amount of CO_2-air mixture to the producer ash pit.

The firing eyes for admitting of gas in the kiln need not be large; in fact, it is better for them to be small, and to be located as high up below the arch as possible. By this high location the height of the gas space over the fuel bed is increased, which tends to give the gas a push, as all hot columns show pressure on top and suction below. With high location of the gas port, the cooler depth is also increased, and that is an even more important factor.

Combustion Air

The gas entering the kiln should get air from two points. One is right in the eye from a tube of special heat-resisting metal such at Fultaloy, which gets its supply from the CO_2-air fan and delivers it in such a manner as to create a suction on the producer by injector action. The gas gets this air late enough so its only burning can take place in the kiln, which is as it should be. In case of direct fired furnaces, most of burning takes place in the furnace, which could be called all wrong. This primary air supply is, however, insufficient to entirely burn the gas and the desire is to have it act more to increase the volume and force towards the kiln center and deliver gas throughout the kiln cross-section, and prevent it from slipping only partially burned up the wall.

The intention is to have the highly preheated air coming up through the cooler support most of combustion. Preheated air naturally is far more effective than cold air and its proper use greatly improves kiln performance. If the cooler is fairly deep and the arrangement for kiln trimming as shown; that is, with arch and poke-holes properly located, it is deemed that even on these old fashioned and low kilns, coolers could be utilized as air preheaters rather than maintained sealed and lime drawn hot.

Conclusions

In recapitulating, we see that we are taking a kiln of the old, apparently hopeless type, and without changing its general configuration, we improve it along four most vital lines, as well as several other less important points.

(1) By closing the kiln top we assure the beginning of immediate preheating of the stone.

(2) By closing the kiln top we also increase the average temperature and better the kiln draft.

(3) By adopting a semi-gas producer we secure conditions conducive to a steady production of combustible gas.

(4) By deepening the cooler and strategic locations of poke-holes and arch pier, we make use of this cooler as an air preheater. The result is more lime, better lime, less fuel for a given amount of lime, and longer kiln life.

Company Dinner

National Lime and Stone Co., Carey, Ohio, held a dinner for its superintendents the latter part of January, at which the menu was phrased as follows:

Cranberry Cocktail
(State Specifications)
Steak (Modified Abrasion)
Mushrooms (Low Iron)
Parisian Potatoes (Concrete Mix)
Gravy (Cylinder Oil)
Pickles (Steel Mill Flux)
Olives (Ball Bearings)
Celery (Wire Rope)
Fruit Salad (Uniformly Graded)
Parkerhouse Rolls (Macadam)
Brown Bread (Bituminous)
Crabapple Jelly (Belt Dressing)
Butter (Cup Grease)
Pie (Boiler Plate)
Tea (Red Engine Oil)
Coffee (Boiler Compound)
Cigars (Drilling Cable)
Cigarettes (Safety Fuse)

Plant Improvement

Ladd Lime and Stone Co., Cartersville, Ga., is engaged in an expansion and improvement program to better the quality and increase the output. Col. W. H. McNaughton and R. N. Soper recently visited New York and Philadelphia to make machinery purchases.

Takes Sewer Contract

M. J. Grove Lime Co., Lime Kiln, Md., has taken a contract for construction of a sanitary sewer system at Frederick, Md., to cost $15,500.

A $600,000 Expansion Program

Chemical Lime Co., Bellefonte, Penn., has succeeded in obtaining a $500,000 loan from the Reconstruction Finance Corporation, to which it has added another $100,000, to use in opening a limestone mine and building a modern new rotary kiln lime plant in Buffalo Run Valley, just west of the company's present operations.

The company was reorganized in February with Willard L. Case, St. Davids, Penn., president; Robert S. Walker, vice-president and general manager; Thomas M. Brown, Pittsburgh, Penn., vice-president in charge of sales; W. Raleigh Cliffe, vice-president and chief engineer; William J. Emerick, treasurer and assistant secretary; Robert M. Gehret, secretary and assistant treasurer; Swengel H. Smith, general superintendent in charge of operations; Bayard Magee, maintenance engineer and electrical engineer. Messrs. Cliffe and Magee were formerly employed by the American Lime and Stone Co., Bellefonte.

Increases Capacity

Washington-Idaho Lime Products Co., Orofino, Idaho, is installing a new tube mill, a ball mill and a hammer mill, and contracts have been let for new silos which will increase portland cement storage capacity six-fold.

Income Tax Allowances

Monroe Sand and Gravel Co., Monroe, La., is involved in an income tax suit with the federal government which has points of interest to every sand and gravel producer. The suit is part of the federal government's attempt to pursue members of late Huey Long's political organization for alleged unreported incomes. The Monroe Sand and Gravel Co., like all other producers who sold highway materials to the state, is involved because in order to get this business commissions or bribes had to be paid. The government is attempting to have these commissions disallowed as deductions from the sand and gravel company's income. The government also contends a 6⅔% depreciation per year on a 15-year life for a dragline and for a dredge boat and equipment is excessive, also a 10% depreciation on the washing and screening plant. A 3½c per cu. yd. depletion charge is claimed to be excessive.

To Push Rock Phosphate

Ruhm Phosphate and Chemical Co., Mt. Pleasant, Tenn., has acquired the services of E. W. Rusk, recently farm adviser for Coles County, at Charleston, Ill., and known to radio listeners as "Farmer" Rusk, as supervising salesman. He will devote his entire time to increasing the use of ground rock phosphate for direct application to the soil, throughout the corn belt states.

Digest of Foreign Literature

By F. O. Anderegg,
Consulting Specialist, Newark, Ohio

Shrinkage of Portland Cement as Dependent upon Physical and Chemical Influences. Prof. Hans Kühl and Dzung-Hsien Lu have published a careful study of the effect of various physical conditions during curing and chemical changes in composition on the shrinkage of portland cement that occurs on standing in air. A review of the literature showed the results to be rather fragmentary and often contradictory, so that a rather complete experimental investigation should be made. Tests were made with specimens 1 x 1 x 4 in., using the Bauschinger apparatus. The neat cement was usually mixed with 18% of water to an earth dry consistency and measurements were started in 24 hours The specimens were suspended by threads in a 12-compartment cabinet in a cellar whose temperature varied between 10 and 15 deg. C. Humidities were controlled by means of sulfuric acid at different concentrations. A series of 13 laboratory cements was carefully burned and ground to leave a residue of 9% on the 176-mesh sieve. Those cements low in lime were quenched to prevent dusting. Reproducibility of shrinkage results was within 4%.

The first condition studied was the effect of storage of the cement before using, and it was found that the longer the cement was stored, whether in dry air, moist air, or exposed to room air, the less the shrinkage. This finding would seem to have important practical results. For instance, cement stored for 125 days dry (as in a silo) developed only about two-thirds as much shrinkage at 6 months as freshly ground cement of the same lot. The greater the amount of gaging water used, the greater the shrinkage, especially after 7 days. The storage conditions, of course, affected the shrinkage greatly. In water, a continuous expansion was observed, while in saturated air, an expansion could be noted during the first three days, followed by a slow shrinkage. The curves for humidities, ranging from 0 to 40%, were almost identical, the contraction at 180 days being about 8 times that in saturated air, while intermediate humidities brought about intermediate reductions in length. Preliminary storage in water had little, if any, effect by the end of 180 days, although the shrinkage effect was less at early ages for such treatment. To determine the effect of excluding air, one specimen was coated with asphalt, and it was found that some reduction in shrinkage rate did occur at first, but at the end of six months the difference was slight, indicating continuous escape of moisture through the asphalt

Among the synthetic cements, two were high in silica, while the remaining 11 were low in silica, with varying alumina and iron contents. One cement was low in lime and showed the lowest initial shrinkage, but as hydration progressed, the rate increased, to bring it into proper place by 28 days. The first set of experiments was made without adding gypsum and, from these, certain conclusions were drawn: The silica content has little, if any, effect. Lime, after the first few days, has little effect. Any alumina, not combined with iron, seems to have the greatest influence on shrinkage, while cements where the alumina is all in the compound, brownmillerite, are apparently lowest in shrinkage tendency. Six-month contractions varied between 0.18 and 0.30%. On adding varying amounts of gypsum before final grinding to a series of 5 cements of different composition, it was found that for each cement, minimum shrinkage was obtained with a certain amount of gypsum, ranging from about 0.5 to 2%, except where the tricalcium aluminate content was rather high, in which case the optimum amount of gypsum had apparently not been reached during the addition of up to 6%. On storage in water, the specimens expanded more as gypsum was added beyond an optimum, of about 1 to 2%. This indicates the importance of limiting the gypsum to that required for controlling the set.

The addition of calcium chloride produced very interesting results. When freshly prepared specimens were placed in a small container with a hygrometer, relative humidities of 95, 92, 76 and 60% were observed after 24 hours, for 0, 2, 6 and 10% additions, respectively. After preliminary exposure to 60% air, the differences were much smaller. Obviously, the addition of calcium chloride reduces the initial vapor pressure of the moisture in the cement considerably. On adding different amounts of this salt to different cements, it was found that the shrinkage reached a maximum for an amount of chloride, which seemed to depend, partly at least, upon the tricalcium aluminate present in the cement. Larger amounts of salt, by their hygroscopic character, reduced the shrinkage again. One cement, with an admixture of 10%, showed only slight volume change, including a slight expansion during the second three months, when stored in air of 60% relative humidity. Under this condition, 2% of calcium chloride greatly increased the contracting tendency, while 6% produced a reversal in shrinkage. If specimens containing this salt at 6% or more concentration have been stored for some months in dry air or in that of 60% relative humidity and are then stored in water, they swell and usually crack open. *Tonindustrie Zeitung* (1935) 59, No. 71, p. 864; No. 74, p. 913; No. 82, p. 1016; No. 83, p. 1028.

The Hydraulicity of Blast Furnace Slag. This study has been carried out by E. Leduc on quite a number of blast furnace slags, ranging in CaO from 28 to 52%. He worked with both slowly cooled and granulated slags, grinding them to cement fineness and, after mixing with 7% water, molded into 2 x 2-in. cylinders, under 14,000 lb. per sq. in. pressure. They were cured at 168 lb. steam pressure for 8 hours and broken in compression. The results were high, ranging from 1450 to 8200 lb. per sq. in. The non-granulated slags produced the lower strengths, but that some was developed, it is concluded that some beta dicalcium silicate must have remained in the slowly cooled slag. On adding 2.5% hydrated lime, generally, the strengths ran appreciably higher. On mixing with slag sand, quite good results were also obtained, although somewhat lower than with the finely ground slag alone. Calcium sulfate, whether anhydrous or hydrated, has a simulating action, similar to that of lime, in promoting the hydration and hardening of slag. *Revue Materiaux Construction Travaux Publics* (1935) No. 310, p. 161.

The Formation of Hydrates of Calcium Silicate. Wilhelm Köhler synthesized mono-, di- and tricalcium silicates and placed them in bombs with water and heated to different temperatures for several days. From the first compound he was unable to obtain any reaction, while the other two gave very definite crystals of Hillebrandits, $2CaO.SiO_2.H_2O$, as proved by examination of the optical properties, by taking X-ray spectra and by chemical analysis. From the tri-silicate, crystalline calcium hydroxide was also obtained. On ignition, the products from the di-silicate returned to that compound, while the hydration products from the tri-silicate were ignited to dicalcium silicate and CaO. *Ton industrie Zeitung* (1935) 59, No. 62, p. 739; No. 63, p. 754.

Light Weight Concrete in House Building. The use of natural pumice from the Nette and Brohl valleys began in the sixth decade of the past century. In the eighth decade one concern built 30 apartment houses of cinder concrete, tamped in place in cast iron forms, and most of these houses are still being occupied, the inhabitants not being aware that their houses are not built of brick The most serious problem to be encountered is that of shrinkage. Numerous buildings of monolithic, light weight concrete, have developed cracks about every 40 ft. It is important to get rid of the early part of the shrinkage, whether by using blocks already well cured, or by permitting the concrete, cast in place, opportunity for carrying out a large part of its shrinkage before completing the building, or by providing elaborate shrinkage joints. In Germany, especially in the western part, much attention is being given to the use of light weight concrete, and many installations are being made. An address by Architect Treuge in *Zement* (1935) 24, No. 36, u. 583, No. 37, p. 598.

Air Cleaning and Classifying Sand Aggregate

VARIOUS EFFORTS have been made to use air instead of water for cleaning and classifying fine aggregates. In the deserts through which the Colorado River aqueduct to Los Angeles is now being constructed, water is scarce and the engineers of the Metropolitan Water District have developed apparatus for air cleaning and separating the fine aggregate for concrete. These plants are described in *Engineering News-Record* of March 5 by John Stearns, a division engineer.

At first a suction process was tried but it proved to be expensive because dust was drawn into the machinery with resultant excessive wear on bearings. Now the initial dislodgement of the fines is done by blowing rather than sucking, although a suction draft continues to be the more convenient means of moving them in at least some stage.

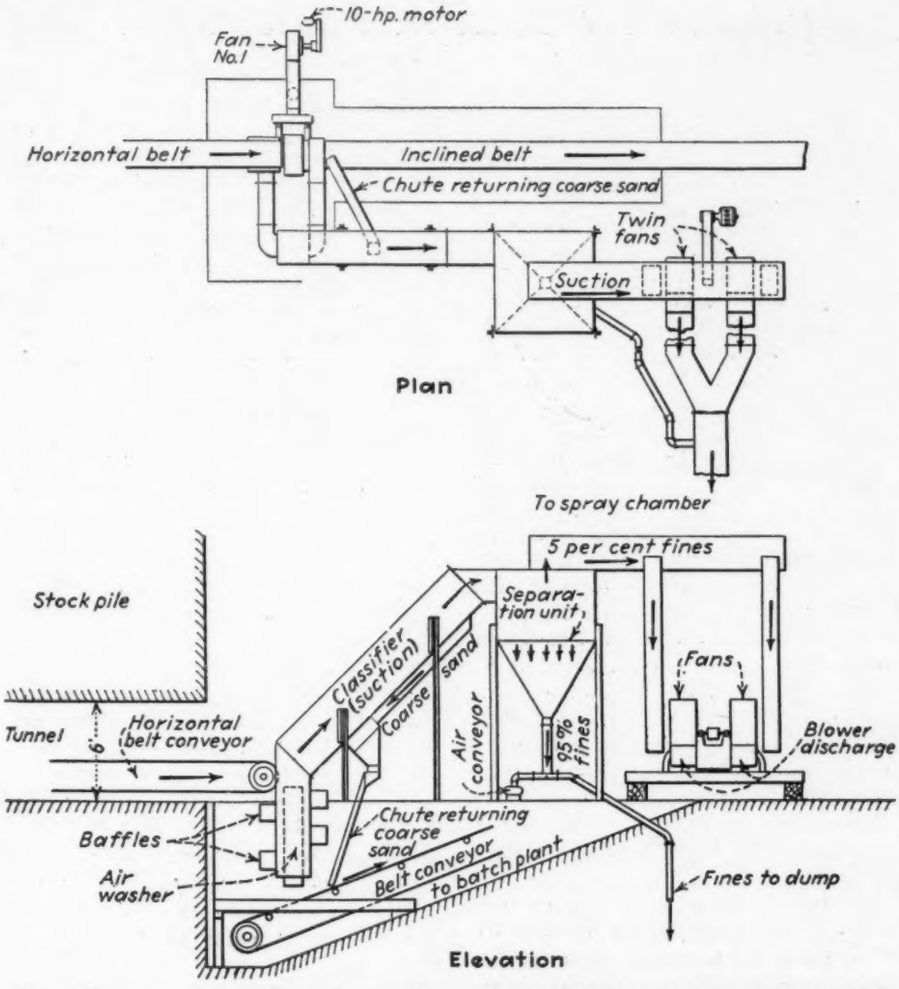
One of the fundamentals discovered was that the proper place to extract the excess of fines is where the pit-run material enters.

Careful observations are made on moisture content of pit-run material. Where the moisture content is as high as 2 or 3% segregation by blowing becomes difficult, sometimes impracticable. With moisture content below 1% the process can be maintained on an effective operating basis. The several stages of the process require to be observed, and adjustments in operating plan are necessary from time to time.

Essentially the problem is to remove from the aggregate a considerable percentage of the fines that would pass through 100-mesh, and at the same time to avoid removal of any of the plus-100-mesh material. The average source of aggregate along the aqueduct contains only about 12% of fines between 48- and 100-mesh, whereas 15 to 16% of this size would have been the ideal combination. After introduction of the trays on the under side of the 22-in. pipe in which the fines are blown away, it was found possible to recover the small percentage of the plus-100 material that otherwise would have escaped.

The principle of the air segregation involves an updraft or blast of air through pit-run material falling within a vertical pipe in which are fixed buffers or splitters of some sort. The upward movement of air catches the fines and carries them into a pipe, sometimes horizontal and sometimes inclined, on whose under side is a false bottom or trap to catch the plus-100 material. By varying air velocity and the size and shape of the traps, it is possible to put back into the sand nearly all the sand of this desirable grade.

At the plant illustrated in the accompanying sketch 110 to 120 tons per hour of aggregate is handled, of which 30 tons is saved. The quantity of fines removed is from 5 to 8 tons per hour. The incoming aggregate is treated to an air blast in a heavily built unit 16x30 in. in cross-section and about 6 ft. high. Four adjustable baffles interrupt the free flow of the aggregate and loosen the dust. Air is blown in under each of these baffles. Suction removes the dust to the classifier.



Flow diagram of plant for air cleaning and classifying sand aggregates, which handles 110 to 120 tons per hour

The dust-laden air in the suction line is conveyed up through a classifier, adjustable so that sand of the desired coarser grade (48- to 100-mesh) may be recovered from the under side and returned through a continuous dust-discharge valve to the inclined belt conveyor. The fines continue on through the classifier into the separation unit in which about 95% of the dust falls to the bottom of the chamber and is removed by an air conveyor. The relatively clean air from the dust collector passes on to the twin fans, which have a combined capacity of 20,000 c.f.m. The discharge line from the twin fans is continued about 300 ft. from the plant, to minimize nuisance from the fine dust that it discharges into the air.

The fan, which delivers air under pressure (No. 1 in the accompanying sketch) is driven by a 10-hp. motor, has a capacity of about 5,000 c.f.m. The static pressure is between 4 and 5 oz.

All the air ducts are fitted with butterfly valves and quadrants, so that the entire equipment may be adjusted and balanced to provide the regulation required for various degrees of fineness, percentage of fines and, to some small degree, for the variation of moisture content. The plan has been to subject the falling material to blast and suction of sufficient strength to remove as much of the fines as possible. The use of four baffles as compared to a single baffle very greatly improved the separation at the point of initial treatment.

The fines that accumulate in the bottom of the dust collector are delivered by a rotary seal valve into a high pressure air system actuated by a positive blower. This material is blown to a tailings pile that is about 300 ft. from the plant.

New Slag Product

Superock Co., Birmingham, Ala., has been organized by the Republic Steel Corp., to market a new light weight slag aggregate, made by a patented process at a plant recently completed by the Republic company. C. S. Robinson is president of the Superock Co.

BLENDING Classifier Products to Make Specification *SAND*

By Edmund Shaw,
Contributing Editor, Rock Products

IT IS AN INCREASINGLY common practice for sand producers to classify sand into three or more products which are afterward recombined in such proportions as to meet a given specification. Usually the combination is by trial and error. Combining by a fineness modulus method gives definite percentages at once, and so often saves work. One familiar with the methods can calculate very quickly whether the grading will be satisfactory at any critical point.

As applied to sand, the fineness modulus (written FM) is the sum of all the percentages remaining on the sieves of either of the following series, divided by 100:

	SIEVE NUMBERS					
U. S. Std.....	4	8	16	30	50	100
Tyler Std.	4	8	14	28	48	100

The numbers vary but the openings are so nearly the same that either series may be used.

As an example, it will be assumed that a plant is making the following classifier products:

	% RETAINED ON						
Sieve No.	4	8	16	30	50	100	FM
No. 1, Coarse.	0	36	58	76	90	99	3.59
No. 2, Int.....	0	2	12	30	58	95	1.97
No. 3, Fine...	0	0	2	8	25	80	1.15

These are to be combined to meet this specification: "Blended sand, having a fineness modulus of 2.50 to 3.00, approximating in grading:

	% RETAINED ON						
Sieve No.	4	8	16	30	50	100	FM
	0	12	32	56	80	95	2.75

This is, in effect, the specification for sand used in Grand Coulee dam concrete.

The classifier products are produced in the following percentages: No. 1, coarse, 35%; No. 2, intermediate, 45%; no. 3, fine, 20%. If we take these percentages of the fineness moduli of the products, given above, and add, we shall have the fineness modulus of the whole, thus:

35% of 3.59 equals....	1.25
45% of 1.97 equals....	.89
20% of 1.15 equals....	.23
Totals 100%.....	2.37 FM of whole

Since this FM (2.37) is less than the lower limit, 2.50, there must be a waste of some fine material. The coarsest product that can be made without splitting a product is the combination of No. 1 and No. 2, allowing No. 3 to go to waste. Since 20% is discarded, leaving 80%, the percentages of No. 1 and No. 2 will be 35/80 and 45/80, or 44% and 56%, approximately. Then

44% of 3.59 equals	1.5796
56% of 1.97 equals	1.1032
100%	2.6828, or 2.68 FM.

This satisfies the specification and makes an easy operation, but it might not satisfy the producer who wishes to market as much of the product as possible, and the 20% of No. 3 would be a considerable waste. We may try wasting only one-half of No. 3 to see what the FM would be. Adjusting the percentages we have:

39.4% of 3.59 equals..	1.42
50.6% of 1.97 equals..	1.00
10.0% of 1.15 equals..	.115
Totals 100.0%	2.535 FM

This is just within the specification, and it would take careful operation to maintain it.

But fineness modulus is only part of the specification. These blendings must be tried to see if they approximate the specification grading. For the combination of No. 1 and No. 2 the grading is:

	% RETAINED ON					
Sieve No.	4	8	16	30	50	100
44% of No. 1	0	15.4	25.6	33.4	39.6	43.5
56% of No. 2	0	1.2	6.7	16.8	32.5	53.1
100%	0	16.6	32.3	50.2	72.1	96.6
Specification	0	12	32	56	80	95
Differences	0	+4.6	—0.3	—5.8	—7.9	+1.6

Presumably this would be accepted because a grading with even greater differences was accepted, according to Anthony Anable's paper, reviewed in the March issue of Rock Products.

The grading with all of Nos. 1 and 2 and half of No. 3 is as shown at the top of the next page.

The differences of 12.5 and 12.7 are so large that they might be considered to justify rejection.

There are some engineers who insist on having 80% retained on 50 mesh. This is theoretically impossible with these products, if one is held to the upper FM limit of 3.00. There is 90% on 50 mesh in No. 1 and 58% in No. 2, and 80% is required. The formula for mixtures is:

$$\frac{\%\text{ required} - \%\text{ fine}}{\%\text{ coarse} - \%\text{ fine}} = \%\text{ coarse in mix}$$

Substituting,

$$\frac{80-58}{90-58} = 68.7\%\text{ coarse, }31.3\%\text{ fine}$$

The FM of 68.7% No. 1 and 31.3% No. 2 is 3.097.

The mixture formula applied to fineness moduli is:

$$\frac{\text{FM required} - \text{FM fine}}{\text{FM coarse} - \text{FM fine}} = \%\text{ coarse in mix}$$

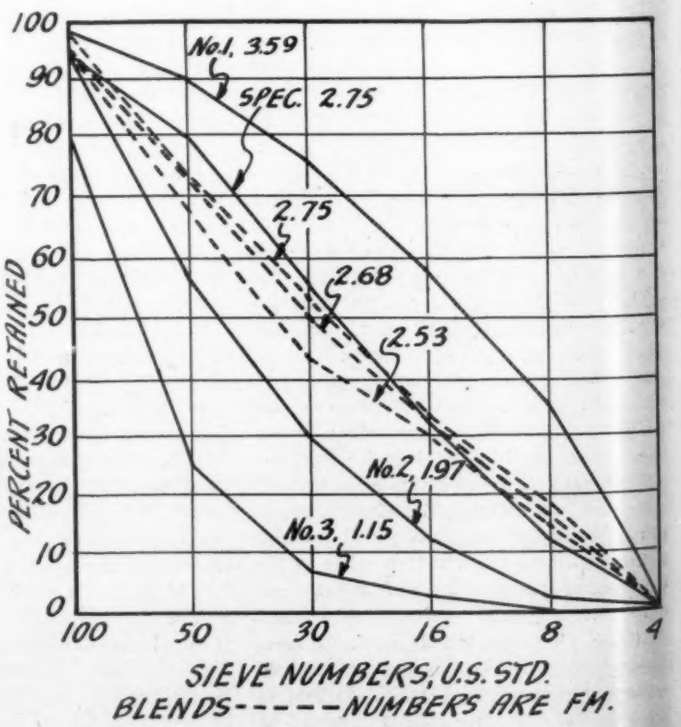
For example, the percentages of No. 1 and No. 2 for FM 2.75 are:

$$\frac{2.75-1.97}{3.59-1.97} = 48.15\%\text{ coarse, }51.85\%\text{ fine}$$

The grading of this FM 2.75 blend is:

Sieve No.	4	8	16	30	50	100
Retained on	0	18.3	33.6	52.1	73.2	97.7

With three components, the percentage of one must be set. The others may be found by the formula. Assuming 6% of No. 3, the percentages of No. 1 and No. 2 for FM 2.6 may be found thus: 6% of 1.15 is 0.069,



Graph of various specification sands achieved by fineness modulus calculations

	% RETAINED ON					
Sieve No.	4	8	16	30	50	100
39.4% of No. 1	0	14.2	23.8	29.5	35.4	39.0
50.6% of No. 2	0	1.0	6.1	13.2	29.4	48.0
10.0% of No. 3	0	0.0	0.2	0.8	2.5	8.0
100%	0	15.2	30.1	43.5	67.3	95.0
Specification	0	12	32	56	80	95
Differences	0	+3.2	—1.9	—12.5	—12 7	0

say 0.07. 2.60 — .07 equals 2.53. Then,

$$\frac{2.53-1.97}{3.59-1.97}=34.5\%$$ No. 1; 65.5% No. 2; 34.5% of 3.59, plus 65.5% of 1.97 equals 2.53, plus .07 equals 2.60. The adjusted percentages are, 32.6% No. 1; 61.7% No. 2 and 5.7% No. 3.

Tendency Toward Accurate Grading of Sand

IN HIS REPORT to members of the National Sand and Gravel Association as director of its engineering research division, Stanton Walker writes:

"Recent studies have indicated the desirability of exercising closer control over sand grading. Specifications developed within the last three or four years generally include some control over the uniformity of the material furnished from a given deposit. A still more recent trend is represented by more rigid requirements for percentages of finer sizes. Where earlier specifications permitted, for example, from 5 to 25, 5 to 30, 2 to 30, or even 0 to 30 per cent passing the 50-mesh sieve, recent requirements place the minimum at 10 per cent, and in some cases as high as 15 per cent. In the case of some deposits such a requirement works a real hardship and introduces difficult production problems.

"This trend in specifications has the support of many outstanding concrete engineers. Undoubtedly the inclusion of more of the finer sizes results in greater workability and probably also in greater uniformity. The effect on the strength of the concrete is negligible and is, for the most part, a reflection of better placement. Better placement as well as a greater uniformity unquestionably contribute to durability.

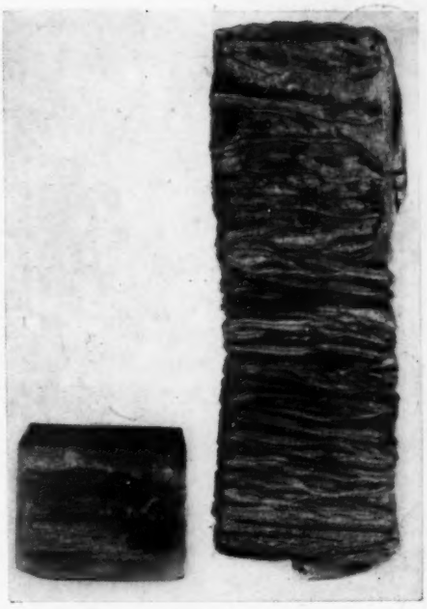
"It seems clear, therefore, that attention to this phase of specifications is needed and that, in a broad sense the trend is probably in the right direction. The writer is convinced, however, that the solution of the problem goes far beyond a simple limitation of the amount of material finer than a No. 50 sieve, or a similar size, and involves a consideration of the complete grading of the sand. He feels also that the trend away from coarse sands shows possibilities of going further than is dictated by good engineering practice.

"An investigation is being started in the research laboratory of the Association bearing on this problem. A sand has been separated into several sizes and is being recombined into a wide range in gradings. The investigation, for the time being at least, is being confined to studies of mortar. The water requirements, workability, density, yield, tendency to segregate and ability to retain water, will be studied for various mixtures. An independent research along the same lines is also being carried out by a member company, which should furnish evidence of the practicable applicability of work along these lines."

Lightweight Aggregate Made from Slate

A PATENTED PROCESS has been developed in Great Britain for burning the waste of slate quarries to make a lightweight concrete aggregate. The product is described in a recent issue of *Concrete Building and Concrete Products* (Great Britain). Burning the crushed slate in a rotary kiln causes it to lose its characteristic cleavage and to expand from 5 to 7 times its original thickness. An expansion of less than 2½ does not give an aggregate which would be considered light.

The final product contains a large number of cavities which make the material light enough to float on water. It was found by examining a series of Welsh slates that those which expanded most readily occurred in Ordovician and Silurian formations. A nodule of treated slate in cross-section is seen to be composed of a mass of small cells separated by glassy walls, and the outside of the nodule is covered with an impervious vitrified skin. The nodule is porous, but by virtue of this skin is impervious to water.



Block of slate before and after heating

Burning

To obtain the light aggregate from slate waste, the material is crushed and heated in a kiln suitable for continuous treatment of granular materials, such as the rotary kilns used in cement manufacture. Proper grading of the crushed untreated slate will result in producing an aggregate of the required size. A much more impervious aggregate is obtained in this way than by crushing large lumps after burning.

Characteristics

In comparing expanded slate slabs with other aggregates, results were very favorable in regard to changes in length on drying and wetting of the expanded slate, showing movement of the order of 0.001%. The slate showed all the qualities for plastering over, nailability, ease in sawing, etc., of other lightweight aggregates. Strength obtained compared favorably with those of other aggregates and bulk density approached that of the lightest pumice. The total soluble salts in expanded slates tested varied from 0.18 to 0.40%.

Tests showed that substitution of sand for the finer portion of the lightweight aggregate made possible adequate strength for reinforced concrete structures. A 2000-lb. concrete made from a mix using 1 part of cement, 2 parts of sand and 4 parts of expanded slate, by volume, had a density slightly higher than 100 lb. per cu. ft.

"Put This in Your Pipe and Smoke It"

NO INDUSTRY is ever static. It goes forward or it goes back. If an industry has a broad conception of its responsibilities to society as a whole, if it keeps abreast of changing market requirements and is alert to new opportunities of service, if it strives ever to create wealth more efficiently, to build men within itself as well as merely to manufacture an article of commerce, and to use to the utmost research as a tool of progress, such an industry will go far and will not be denied. The degree of advancement, however, will depend largely upon the mutuality of interest of the individual members and the unanimity of action in striving toward a common goal. — NORMAN G. HOUGH, in a farewell message to the members of the National Lime Association on his retirement as president and general manager.

New Quarry

Blue Rapids Sand and Gravel Co., Blue Rapids, Kan., has opened a WPA operated quarry near Sabetha, Kan., to supply crushed stone for its highway contracts near Sabetha.

3 things *to WATCH* in your Rotary Cement Kiln if you want satisfactory Combustion Control

SINCE FUEL is of first importance in the cost of cement making, it should be burned and utilized as efficiently as possible. Many forward steps have been taken in the effective utilization of heat liberated in the rotary cement kiln, such as preheating secondary air with the hot clinker, reduction of radiation losses from the kiln by partial insulation, and recovery of much of the heat in the discharge gases with waste-heat boilers, or with chains in wet process kilns. However, the improvement in efficiency of the actual combustion of fuel has lagged behind the progress made in most other industries.

The fuel, whether gas, oil or pulverized coal, should be burned with just sufficient air to provide complete combustion, no more and no less. Incomplete combustion due to too little air results in a significant loss when the fact is taken into consideration that 1% of CO (carbon monoxide) in the stack gases is equivalent to a heat loss of from 47,500 to 60,000 B.t.u. per barrel of clinker. On the other hand, too much air should not be employed, as heat is also lost thereby. For example, if the temperature of the exit gases is 570 deg. F. then the heat loss will amount to about 6500 B.t.u. per barrel of clinker for each 1% of oxygen in the gases. It is evident that the more serious of the two losses is that caused by incomplete combustion, and therefore it is of greatest importance to avoid the presence of CO in the stack gases.

Experimentation with actual operating procedures reveals that observance of three rules results in more efficient combustion conditions as well as more satisfactory kiln performance. These rules are:

(1) Maintain a uniform fuel feed and primary air supply.

(2) Vary the speed of kiln and raw material feeder to control burning.

(3) Maintain constant hood draft.

Observance of the first rule provides no difficulties with modern equipment. With oil and gas fired kilns the fuel feed may of course be easily adjusted by regulation of the fuel valves. On pulverized coal fired installations, fuel feeders are available which may be depended upon to supply the coal at a uniform rate without starving or flooding. In addition, some types of pulverizers are now provided with pulverizer feeder controllers which insure that the pulverized coal supply will always be in proportion to the primary air supply.

Photo-Electric Cell

The speed of the kiln and the rate of the

*Bailey Meter Co., Cleveland, Ohio.

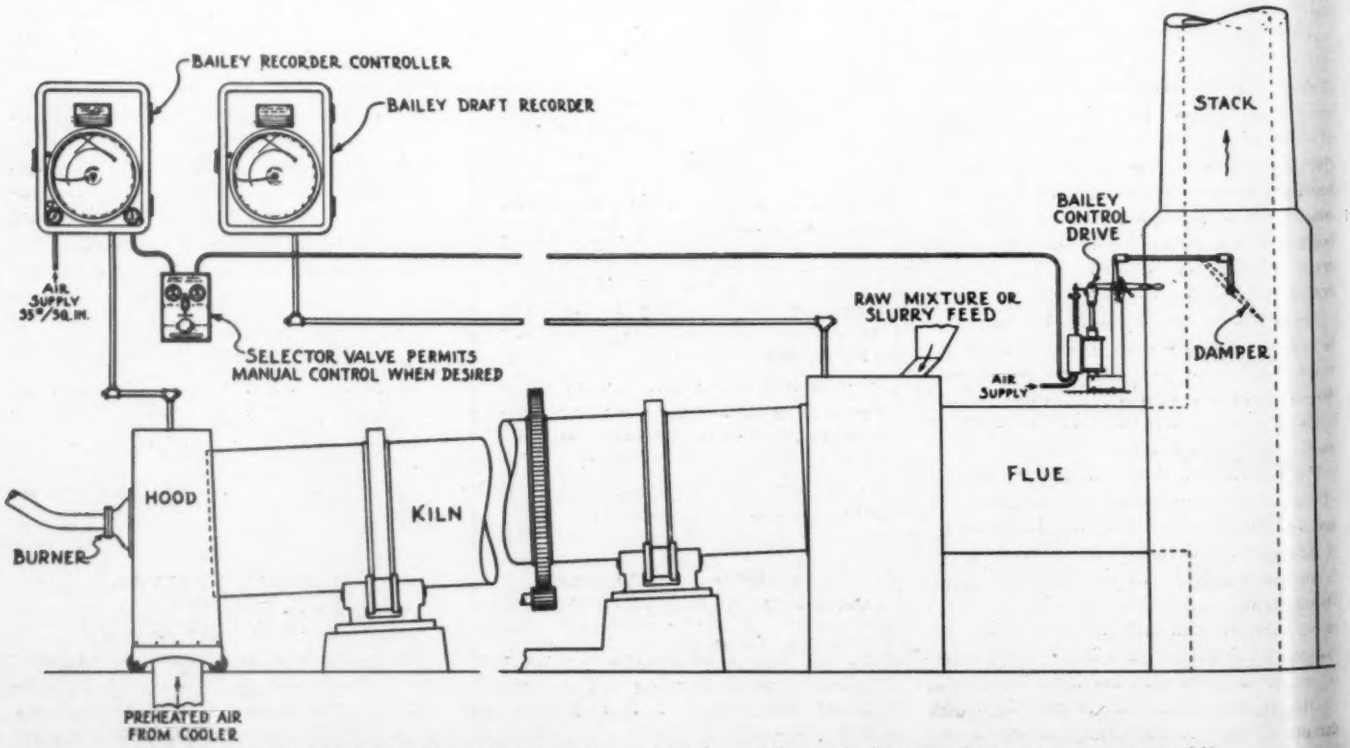


Fig. 1—Diagrammatic drawing showing the application of hood draft control to a rotary cement kiln

raw mixture feed are regulated in order to maintain the proper amount of burning of the clinker. This may be accomplished manually or, more effectively, by automatic means. The automatic system utilizes an electric eye (photo-electric cell) which is mounted just outside the kiln hood and is pointed through an opening in the hood to the spot where the clinker begins to change color, at about 10 or 12 ft. from the discharge end of the kiln. If this point where the color changes tends to creep either up or down the kiln due to variations in the fuel feed, characteristics of the coal, or other causes, the electric eye device functions through relays and electrical controllers to vary the speed of the kiln and also the rate of raw mixture feed as required to maintain the hot zone at a given location. Clinker discharge temperature, therefore, is held relatively constant.

It is in rule No. 3, or maintenance of constant hood draft, that the direct solution to efficient combustion is found. Provision for uniform feed of fuel and correct control of the kiln speed will not maintain the best operating conditions with a fluctuating draft. All other conditions remaining constant, a variation in draft will immediately change the position of the hot zone of the kiln and also directly influence the efficiency of combustion. This is evident when it is considered that the draft at the hood determines the amount of secondary air which is brought through the cooler, and the amount of infiltration of cold air around the hood seal. Therefore, the hood draft should be maintained at the value which will provide the correct amount of air for good combustion at the optimum firing rate.

This procedure not only insures economical combustion, but in addition peak flame temperature can be maintained, which is necessary for the maximum production of clinker. Furthermore, kiln performance is more readily stabilized and both the quality of clinker and the uniformity of its discharge are substantially improved. Another benefit provided by automatic hood draft control of kilns equipped with waste-heat boilers, is that steam production of the boilers is steadier, due to more uniform flow of hot gases from the kilns.

Draft control, to be really effective, must be accomplished automatically. A simple and reliable system of automatic control is shown diagrammatically in Fig. 1. Present installations have proved entirely satisfactory under practical operating conditions.

The control system is comprised in general of two main units, the recorder-controller and the control drive. The recorder-controller is mounted at the firing end of the kiln and is connected to the hood by a single pipe line. Its actuating mechanism, consisting of an oil-sealed bell, responds to the slightest variations of draft in the hood and by means of an air pilot valve it commands operation of the control drive to position the stack damper or the uptake damper of the waste-heat boiler so that the hood draft is maintained at the desired value. A small quantity of compressed air at 35 lb. pressure or higher is required for operation of this system.

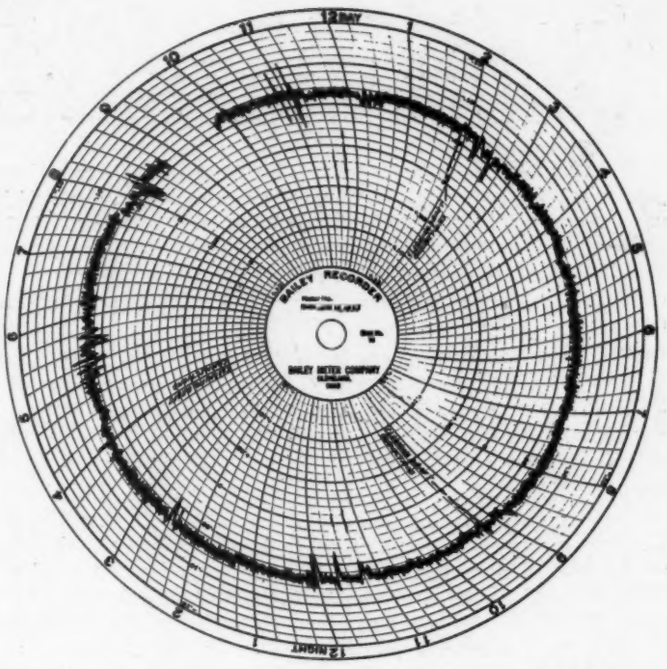


Fig. 2 — Reproduction of a chart from a hood draft controller installed on a cement kiln

The recorder-controller also furnishes chart records which act as a check on the operation of the control equipment and provide daily graphic pictures of hood draft. Reproduction of a chart made recently by a recorder-controller in a large Eastern plant is shown in Fig. 2. Full chart range is from plus 0.15 in. to minus 0.15 in. of water, and the control equipment is adjusted to maintain the hood draft at minus 0.07 in. On this installation a rotary cooler is used which has its discharge end out of doors, thus being subject to wind variations and other atmospheric changes. In spite of this, it may be seen from the chart that the hood draft is normally maintained constant within plus or minus 0.01 in. of water. Variations in kiln lining, or the formation of rings, have no effect on the accuracy of the control.

As a supplement to automatic hood draft control it is desirable to install a draft recorder on the firing platform which will record the draft existing at the upper or feed end of the kiln. This is of value in revealing the formation of rings by an increase in draft loss through the kiln. Knowledge of ring formation at an early state is particularly valuable in that it enables the operator to take steps to eliminate them before they build up to a stage detrimental to continuous operation of the kiln.

Reopens Sales Office

Medusa Portland Cement Co., Cleveland, Ohio, has opened a district sales office in the Ohio building, Toledo, Ohio, with Frank G. Mooney in charge. The company formerly had a local sales office here, but this was discontinued during the depression. Increasing business activity in the Toledo area, Mr. Mooney said, brought the decision to make this city a district sales headquarters. Toledo territory will include Michigan, Indiana and Northern Ohio.

New Cement Plant

Union of South Africa: There is a report that a new cement factory will be established in the Free State in the near future. It is stated that a company known as the Ventersvlakte Cement Holdings, Ltd., has been floated in Denmark with a capital of $2,500,000 and has already acquired a farm near Henneman at a cost of $135,000 and also a portion of an adjoining farm. Exhaustive prospecting and preliminary quarrying operations are said to have revealed almost inexhaustible supplies of excellent quality lime stone for the manufacture of cement. Building operations on the factory are about to commence, and the necessary machinery is said to have already been ordered. The limestone, it is stated, will be conveyed to the factory by railway line and cableway for which the plans and diagrams have been completed.

New District Office

Portland Cement Association, Chicago, Ill., has opened a new district office at Richmond, Va., State Planters' Bank building, to handle activities in Virginia and North Carolina. H. D. Humphries is manager.

Suspends Production

Pennsylvania-Dixie Cement Corp. is reported to have suspended production at its Clinchfield, Ga., plant beginning March 1 for an indefinite period; storage facilities being full, shipments will be made from stock. Unfavorable weather has delayed construction work beyond expectations.

New York State's Contemplated Silicosis Legislation

NEW YORK STATE'S Industrial Commissioner Elmer F. Andrews announced recently that a silicosis bill has been prepared for introduction in the legislature. The bill is the product of more than five months of conferences between representatives of employers and employees in dust hazard industries. Among the features of the bill are:

Provision for special and limited workmen's compensation to employees disabled by silicosis or other dust diseases;

Prohibiting so far as possible compulsory preëmployment examinations of wage earners.

Provision for a campaign of prevention of silicosis and other dust diseases in industry by the devising, installation and effective use of dust-eliminating appliances and methods, $75,000 to be expended annually therefor.

Making mandatory the use of approved dust-eliminating devices and methods on all public works, including highways and construction both indoors and outdoors. (Note text of proposed Section 222a attached.)

Directing the Industrial Commissioner and the Industrial Board to promulgate Industrial code rules and regulations for the effective control of silicosis and similar diseases in all industries and operations wherein silica dust and other harmful dust hazards are present.

An appropriation of $100,000 for administrative expenses is to be asked in a separate bill.

"The problem of silicosis and other dust diseases is a complex and difficult one, involving as it does specialized medical and engineering knowledge, varied industrial processes and working conditions and compensation liability incurred over periods of from 5 to 25 years," Commissioner Andrews said in announcing that the silicosis bill is now ready for introduction. "At the last session of the Legislature a bill was passed providing special limited compensation for silicosis. Immediately, employers and insurance companies, who had presumably agreed to the bill while it was under consideration, expressed panic lest the bill, if signed by the Governor, would saddle the dusty industries with accrued liabilities requiring insurance deposits and premiums which the employers could not possibly pay. Employers in the foundry and stone industries particularly declared that they would be unable to continue operations because they would be required to make deposits of from three to six hundred dollars per employee, and in addition to pay insurance premiums increased three and four fold. Heeding the plea that these industries and employment therein could not be continued if the bill became a law, Governor Lehman disapproved it, remarking that silicosis and other dust diseases would be covered in any event under the all-inclusive occupational disease amendment to the Workmen's Compensation Law.

"The all-inclusive occupational disease amendment became effective September 1, 1935. Before and after that date, there was a tendency among insurance companies to require covered employers to have their employees examined, presumably in order to eliminate those who were suffering from silicosis and other occupational diseases. This practice was discouraged by me as much as possible. But insurance companies, arguing that they had a duty to protect their stockholders against unknown and possibly heavy liabilities, continued to press for physical examinations of employees, particularly in those industries and plants in which a serious dust hazard existed. Estimates of the possible accrued liability varied widely. The highest estimate for the entire state was $10,000,000. Personally, I believed this figure fantastically high and that, in practice, the actual cost of awards for disability due to silicosis and other dust diseases would be considerably less than the estimates. But the trouble was and is that there does not exist a sufficient basis of exact knowledge on which to combat the high estimates and to establish compensation insurance rates on a scientific basis. Actuaries have had to resort to guess work and in their guesses they naturally have been inclined to protect their employers, the insurance companies, against possible loss. Our records show that, to date, only eight dust disease claims, several of them doubtful, have been filed.

"Several months ago, we were faced with a crisis in the dust hazard industries. Old employees were threatened with physical examinations and possible loss of jobs. They and their representatives were unable to rebut the argument that insurance companies must know the extent of the liabilities they were being asked to insure. Without physical examinations, the insurance rates offered were so high that employers declared they would have to discontinue operations. At this point, a series of conferences between representatives of employers, insurance companies, and employees was begun. The purpose was to work out some sort of method whereby the dust hazard industries could continue to operate without throwing old employees out of work, and at insurance rates which would not increase the cost of operation above the level of competition with employers in adjoining states which do not offer any compensation for silicosis and other dust diseases. While these conferences were in progress, a sort of standstill agreement was reached, whereby operations and the employment of the older and more experienced workers were continued. The State Insurance Fund, at my direction, offered group insurance at cost to foundries and other groups in the dust hazard field.

"Although the bill now to be presented to the Legislature represents a limitation in the maximum amounts of compensation to be paid workers disabled by dust diseases, it may be pointed out that the maximum of $3000 is exactly $3000 more than is offered to workers disabled by this disease in most of the other states. While this limited compensation seems necessary now, I believe that, as our experience with claims for compensation for silicosis is built up in the near future, and as the campaign for prevention provided for in the bill is pushed vigorously, it will be possible to increase the maximum awards. We are entering a new field and, until we know more precisely the extent of the hazard, the number of employees suffering from the disease and the extent of disability, it seems impossible for employers to obtain full compensation insurance coverage at rates which can be paid.

"Proposals have been made recently for Federal subsidies to encourage prevention of dust diseases in the various states and the setting up of some compensation coverage for those disabled by such diseases. This would be of great assistance to us in liberalizing the provisions of the present bill.

"Employees in the dust hazard industries who, through their representatives, have agreed to the limiting of compensation for total disability to a maximum of $3000 and a maximum period of medical treatment of 180 days, while waiving compensation for partial disability, have done so because they prefer to keep their jobs at full wages rather than to run the risk of losing them while holding to rights to full compensation given under the all-inclusive occupational disease amendment.

"The New York State Department of Labor has been cognizant of the dust hazard problem for some years. We have conducted field studies on this subject and have printed pamphlets describing silicosis. The chief trouble has been that lack of funds, which we now hope will be forthcoming, has prevented us from inaugurating a wide program of prevention in industry.

"We in the Department of Labor will now bend every energy and resource to the speedy lessening and final elimination of the dust hazards. This is the first job. It has already been started. As rapidly as it is accomplished, rates should be decreased and it is my hope that within a few years maximum compensation for silicosis and other dust diseases may be increased, until there is no distinction between compensation for dust diseases and that now given for other occupational diseases and industrial accidents."

The silicosis bill provides that "all claims for compensation resulting from inhalation of harmful dust, where the last exposure occurred between the effective date of this act

and September 1, 1935, shall be barred unless filed within 180 days from the day on which this act takes effect."

The provision for compensation for total disability or death due to silicosis or other dust diseases, provides, "If disablement or death occur during the first calendar month in which this act becomes effective, not exceeding the sum of five hundred dollars; thereafter the total of compensation and benefits payable for disability and death shall increase at the rate of fifty dollars each calendar month. In no event shall such compensation exceed an aggregate total of three thousand dollars. The aggregate amount payable shall be determined by the total amount payable in the month in which disablement or death occurs."

The bill provides that "If an employee, at the time of his employment, falsely represents in writing that he has not previously been disabled from the disease which is the cause of disability or death or has not received compensation or benefits under this article, no compensation shall be payable."

The new "Article 4-A," which the bill proposes to insert in the Workmen's Compensation Law, opens with this statement of policy:

§65. Prevention of silicosis and other dust diseases. 1. It is hereby declared to be the policy of the legislature of this state, in enacting this article, to prohibit, through every lawful means available, any requirement as a pre-requisite to employment which compels an applicant for employment in any occupation coming within the purview of this article to undergo a medical examination.

2. The industrial commissioner and the industrial board are hereby required to add to the industrial code, as provided in section twenty-nine of the labor law, effective rules and regulations governing the installation, maintenance and effective operation in all industries and operations wherein silica dust or other harmful dust hazard is present, of approved devices designed to eliminate such harmful dusts and to promulgate such other regulations as will effectively control the incidence of silicosis and similar diseases."

The bill proposes to amend the Labor Law by inserting a section requiring that each contract for the construction of public works shall contain a provision requiring the installation, maintenance, and effective operation of approved appliances and methods for the elimination of harmful dusts. Noncompliance would void the contract. This section reads:

§222-a. Prevention of dust hazard in public works.—In the construction of public works by the state or a public benefit corporation or a municipal corporation or a commission appointed pursuant to law wherein a harmful dust hazard is created for which appliances or methods for the elimination of harmful dust have been approved by the industrial board, a provision shall be inserted in each contract for the construction of such work requiring the installation, maintenance and effective operation of such appliances and methods, and a further provision shall be inserted in such contract that if this section is not complied with, the contract shall be void. In the construction of public works performed directly by the state or a public benefit corporation or a municipal corporation or a commission appointed pursuant to law wherein a harmful dust hazard is created for which appliances or methods for the elimination of silica dust or other harmful dust have been approved by the industrial board, the department, board or officer in the state, public benefit corporation, or municipal corporation or commission or board appointed pursuant to law, having jurisdiction over the construction of such work shall provide for the effective use of such approved appliances or methods in connection therewith. A violation of this section shall constitute a misdemeanor and shall be punishable by a fine of not more than five hundred dollars, or by imprisonment for not more than one year, or by both fine and imprisonment."

This bill is to become effective immediately upon enactment.

It is estimated that approximately 20,000 employees in New York State are exposed to silica and other dust hazards. These workers are principally in the stone cutting, foundry, pottery, glass and enameling industries.

Between September 1, 1935, when the all-inclusive occupational disease amendment became effective, and February 17, 1936, only eight claims for compensation for disability said to be due to silicosis or other dust diseases have been filed with the Division of Workmen's Compensation. Many of these claims are believed to be extremely doubtful.

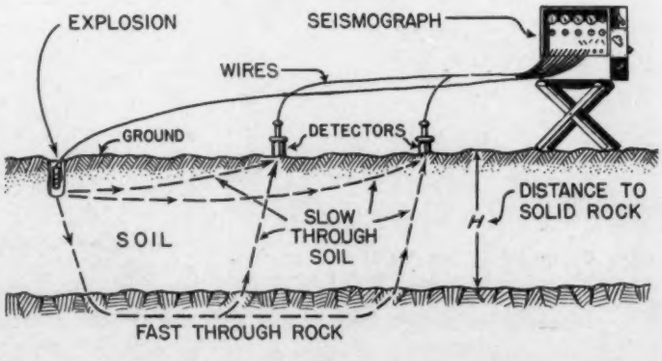
Pickup of Sound Waves Locates Underground Rock

BY PRECISE TIMING of sound waves racing through earth and through earth and rock, engineers of the Bureau of Public Roads have developed practical field methods for determining the distance below the ground surface to solid rock. These engineers have perfected an instrument by which measurements can now be made on the surface with apparatus that will indicate within a few feet how far below the surface rock will be found. Quarry operators can use the method to determine the depth of overburden. The measuring instrument is a highly sensitive electrical device known as a seismograph. The method saves the time and expense of drilling to find out how deep the rock lies.

Accurate results are obtained by measuring the speed with which an impulse from the explosion of a buried blasting cap or small charge of dynamite travels through the ground. Such an impulse will travel through soil at a speed of 1000 to 6000 ft. per second, but the speed through rock is 16,000 to 20,000 ft. per second. A cap is exploded in the ground and at the same time the electric current exploding the cap causes a record to be made with precise apparatus for measuring time. Special detectors are placed at different distances from the explosion and pick up the impulse as it comes through the ground. The detectors are electrically connected with the time-recording device and the time of travel of the impulse from the explosion can be measured to a small fraction of a second.

When a detector is close to the explosion one impulse coming through the soil is received. At a greater distance an impulse coming through the soil is received, and a second one, moving down through soil to rock, through rock, and from the rock up to the surface, arrives a fraction of a second later. At still greater distances the impulse moving through soil and rock arrives ahead of the impulse moving more slowly through soil alone. Knowing the speed of travel through soil and through rock, and the time of travel through different distances, it is possible to calculate how far the impulse went downward through soil before it encountered rock.

This method has been used extensively in prospecting at considerable depth for oil. Elaborate and costly apparatus has been used. The Bureau of Public Roads has now developed simplified apparatus that is giving excellent results.



Seismograph set-up determines thickness of over burden

Sand-Lime Brick Production and Shipments in February, 1936

THE FOLLOWING DATA are compiled from reports received direct from producers of sand-lime brick located in various parts of the United States and Canada. The accompanying statistics may be regarded as representative of the industry.

Twelve sand-lime plants reported for the month of February, this number being three more than the number reporting for the month of January, statistics for which were published in March.

Average Prices for February

Shipping point	Plant price	Delivered
Medfield, Mass.	$ 9.00	$10.50
Pontiac, Mich.	10.00	12.50
Grand Rapids, Mich.	....	13.00
Detroit, Mich.	....	12.50
Mishawaka, Ind.	9.25	....
Syracuse, N. Y.	14.00	16.00–20.00
Saginaw, Mich.	10.50	....
Madison, Wis.	11.00	13.00
Toronto, Ont., Can.	12.00	13.50

Statistics for January and February

	January†	February*
Production	485,610	1,031,640
Shipments (rail)	36,350	28,500
Shipments (truck)	714,370	1,084,582
Stocks on hand	2,045,531	2,284,996
Unfilled orders	1,690,000	7,965,000

†Nine plants reporting; incomplete, two not reporting unfilled orders.

*Twelve plants reporting; incomplete, two not reporting unfilled orders.

Cement Products

TRADE MARK REGISTERED WITH U. S. PATENT OFFICE

Rural Markets for Concrete Products

Easier Credit Is Now Possible Through Use of the Modernization Credit Plan. Farmers Can Now Improve Their Property

IMPROVED INCOME plus a bright outlook, more stringent enforcement of the sanitation laws attending the production of fluid milk and easier credit for building improvement because of the Modernization Credit Plan of the Federal Housing Administration, have opened up the rural market for concrete products. Reports from representatives of the Federal Housing Administration, county agents and other farm extension workers indicate the farmer is busy improving and modernizing his barns, other service buildings and equipment unavoidably neglected in the past five years.

Uses for Concrete Products

Silos are being built, milk houses erected and other new construction noted in dairy sections where city sanitation inspectors are enforcing the laws, now that such operations can be financed and paid out of income. In the past year, indications are that farmers have spent approximately $20,000,000 for building improvements, repairs and new construction. Records of the Federal Housing Administration show that monthly loans under the Modernization Credit Plan have increased steadily and strongly, and spring will undoubtedly see rural building expenditures continuing upward.

What this means to the manufacturer and dealer in concrete products is seen in the uses which farmers are making of concrete blocks and slabs. In fact, concrete blocks are playing a big part in the construction of the modern sanitary milk houses required by law, with an increasing number of slab silos being erected in various parts of the country.

Wm. Cornu of Chino, Calif., chose concrete block for cheap and permanent construction of this milk house to meet sanitation requirements

The fuel bill of the owner of this greenhouse was cut considerably by substituting concrete blocks for wooden sidewalls

"Built it with the help of a neighbor," said Wm. Cornu of Chino, Calif., pointing to his concrete block milk house. "Perhaps not the best looking job in the world, but it meets the law and saves my market. Milk inspectors told me unless I put up a sanitary milk house they would shut off my market in Los Angeles, and, after looking around, I found I could build cheaply and permanently with concrete blocks."

Alex Broker of Collegeville, Minn., was under no such threat when he erected his 14x20-foot concrete slab silo; but he was up against it for rough feed for his herd of 30 Holstein cows. The drought had reduced his hay crop to almost nothing, and corn stover is not relished or very filling for high producing cattle. Milk prices, on the other hand, were not high enough to permit the purchase of much commercial feed.

"Corn stover, shredded and put into the silo saved the day for us," said Mr. Broker. "We would have had a hard time getting through the winter without roughage. Next season we will have it full of real silage."

Mr. Broker, when he built his big L-shaped barn, left room for two silos to be built inside, but neighbors declared he would be foolish to go to such an expense when he had plenty of hay land. Like other dairymen caught without rough feed for his cows when the drought came he wished he had carried out his original plan. Economy and speed dictated his selection of concrete slabs when he found he could finance the equipment with the help of government-insured modernization credit.

Wooden sidewalls, in poor condition, made the growing of plants in greenhouses more difficult and more costly for Paul Schmidle of Ebenezer, N. Y., with winter temperatures getting down as low as 20 below zero in that section.

Replacing the boards with concrete blocks not only reduced the winter fuel bill by one-third but, because of the lighter walls and foundation, made crop and plant production surer.

"This business is not what it used to be," said Mr. Schmidle, "and there is always danger of losing plants during the extreme cold weather, unless the greenhouse is in the best of shape."

Selling the Farmer

While the market for concrete products in rural areas exists, competition is keen among dealers and manufacturers of other building materials which can be used for identical construction purposes. Because of this farmers will have to be sold, just as they are on clothing, food and other necessities. Dealers doing business under the Federal Housing Administration's Modernization Credit Plan declare they find the best ways to get business are to make surveys of trade territories and to interview farmers who need to make improvements.

This concrete slab silo made it possible for Alex Broker of Collegeville, Minnesota, to keep roughage for cattle throughout a drought

In addition to using the plan of government-insured funds to promote sales, dealers and manufacturers may also employ it to make structural improvements, additions and repairs to their own plants and for the purchase and installation of machinery and equipment.

Under a recent amendment to the National Housing Act, loans up to $50,000 made by private financial institutions under the Modernization Credit Plan are available for improvement of commercial and industrial properties. A new booklet, "Equipment and Machinery Eligible for Modernization Credit" has been published and may be had upon request to the Federal Housing Administration, Washington, D. C.

Gravel Concern Makes Block

CLEAR LAKE Sand and Gravel Co., Clear Lake, Iowa, has made a paying proposition out of its ⅜ in. minus gravel (pea gravel) by going into the concrete block business. Pea gravel has been a poor seller in this locality and before the block venture in September was considered a waste size—to be stock-piled and in the way.

At the time of this writing, the only block made so far, the 8 x 8 x 16 standard was being manufactured in the open. A hand-operated machine was installed for the manufacture of pressed blocks. Gravel aggregate is hauled by truck to the 14 cu. ft. Blystone mixer, where a semi-wet proportion consisting of one part cement to 4 parts of No. 2 concrete sand to 3 parts of pea gravel by volume is mixed with six gallons of water.

Plant Improvements

The market for concrete block and other cement products has been so attractive, that plans are under way for extensive improvements. A 50 x 24 foot one story plant is being built of concrete block and three curing kilns 14 by 50 ft. capable of curing 900 blocks at one time. A car system with racks, etc., will also be installed and a system for winter steam curing.

Locally, homes have already been built of these block and future business prospects are making it necessary to step up production. It is likely that concrete block will be included in the specification for a new school building to be built shortly and for other public buildings. Farm buildings, notably cattle sheds built completely of block, furnish a good market for this manufacturer.

New Plant

Stergion Concrete Products Co., Enumclaw, Wash., recently began construction of a new plant. Operations will include manufacture of drain tile, pier blocks, chimney blocks, sewer pipe, connections, septic tanks, well curbing, culvert pipes, and other products. Since the company's organization in 1932, the firm has enjoyed a steady growth in business.

New Firm

Concrete Products and Supply Co. is the name of a new branch of the Alabama Asphalt Construction Co., organized to manufacture a line of concrete products at Sheffield, Ala., including concrete pipe, concrete brick, concrete blocks and tile. It will handle a line of supplies for builders.

Rebuilding

Choctaw Culvert and Machinery Co., Memphis, Tenn., will build a new fireproof plant to replace one recently destroyed by fire. The company's engineering staff has made the plans, and its force of men will build it. A structural steel building, 50 by 100 ft., will contain the equipment, and 5 steam curing rooms will be provided. Total cost of plant and equipment is $40,000.

New Location

Illinois Concrete Crib Co., Bloomington, Ill., has leased property and moved to Mendota, Ill., where a new concrete products plant will be built. The company will add a new line of products, besides continuing the manufacture of concrete blocks for the building of corn cribs and other buildings.

New Company

Colorcrete Stucco Corp., Lake Wales, Fla., was recently organized to manufacture "Colorcrete" for resurfacing, redecorating and waterproofing masonry surfaces. The mixing plant will be located at Lake Wales, near sand producing plants. Agencies will be established in important Florida cities.

Expanding

Richter Concrete Corp., Cincinnati, Ohio, recently acquired two units of the **Avril & Tru-Batch Concrete Co.,** thereby increasing the daily supply of concrete by 700 cu. yd. The Richter Corp. already owned production sites in Cincinnati and has purchased land adjacent to the new units to permit future expansion.

Changes Hands

Spokane Dunn Products Co., Spokane, Wash., concrete brick manufacturer, has been sold to Elza Hurst. The plant will be expanded to include manufacture of roofing tile and pre-cast stone.

To Reorganize

Cement Products Corp., Davenport, Ia., petitioned the federal district court for permission to reorganize under federal bankruptcy act, section 77B. Austin Crabbs is president of the company. The petition was approved and operation under a trustee will continue.

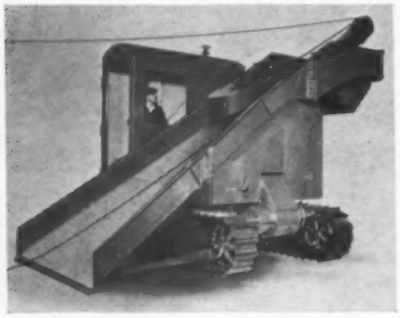
Clear Lake Sand and Gravel Co., Clear Lake, Iowa, uses surplus pea gravel to manufacture concrete products

New Machinery and Equipment

Movable Drag-Scraper Machine

SAUERMAN BROS., INC., Chicago, Ill., announce the Sauerman "Scraper-Loader," a crawler-mounted drag-scraper machine, completely portable under its own power.

This machine is claimed to combine the long range capacity of the drag scraper with the direct loading action of the usual mechanical loader. It is said to be suited to any work that requires hauling materials from a pit, bank or stockpile and loading the materials into trucks or other form



Movable scraper-loader

of transport. One man operates the machine and he has just four simple levers to handle; two of these levers control the scraper and the other two control the steering and travel of the machine.

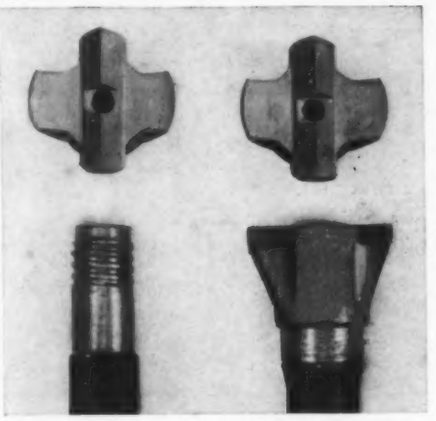
Sauerman Scraper-Loaders are offered in four sizes, equipped with Crescent scraper buckets of ½-, ¾-, 1- and 1½ cu. yd. capacities.

Small Shovel

KOEHRING CO., Milwaukee, Wis., announces Model 251, a ⅝-cu. yd. convertible shovel, crane, dragline, trench hoe. By the use of special high-strength steels, welded construction and simplified design it is claimed that a substantial decrease in weight has been achieved over standard models of this capacity. Special features include two swing speeds to best synchronize with the arc of swing and height of lift; two traction speeds; safety glass in cab; accessibility and removability of vital parts; hoist drums equipped with removable barrels; anti-friction bearings throughout.

Heat-Treated Steels

A. COURCHESNE, INC., El Paso, Tex., quarry and lime plant operator, for the past year has also operated a steel conversion plant for forging and heat-



Drill bits

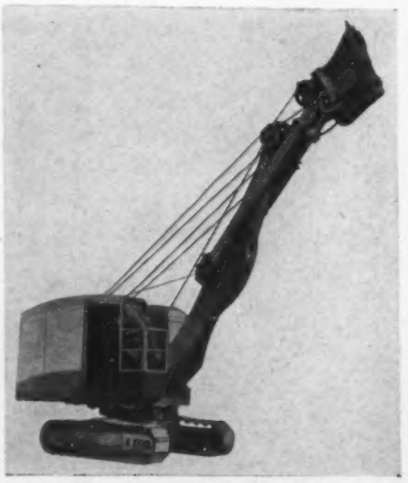
treating steel. A study of drill steel and drill bits has made it possible for this plant to specialize in drill rods and the regrinding and tempering of detachable drill bits.

The latest type equipment is used, forging is done in a semi-muffled type furnace, and heat treating in a muffle type. These furnaces are controlled by electric pyrometers so that the correct heats recommended by the drill manufacturers for their particular steels may be used.

The plant is in charge of A. M. Helpling, superintendent and engineer, who has been affiliated with the mining and quarry industries for 30 years.

Crane Track Wheels

AMERICAN MANGANESE STEEL CO., Chicago Heights, Ill., has added to its numerous line a new type manganese-steel crane wheel of the type illustrated herewith. The double-web construction gives additional strength and insurance against breakage.

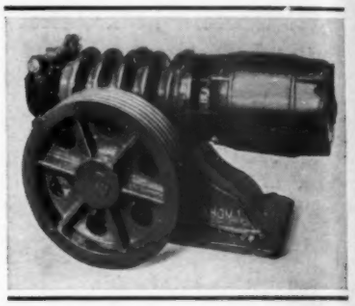


Lightweight shovel

Worm Type Powered Gear in a Hoist Unit

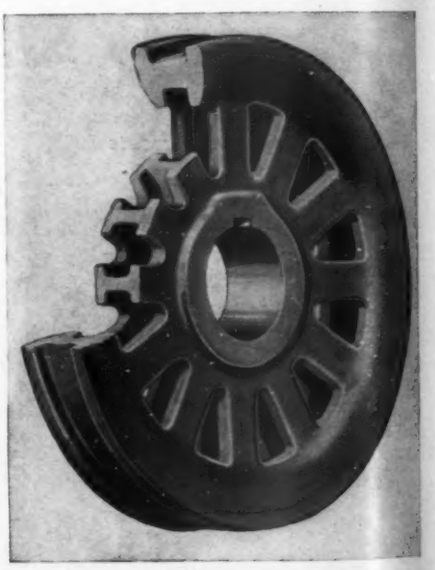
A STANDARD worm type powered gear was recently incorporated in a compact hoist unit by Foote Bros. Gear and Machine Co., Chicago, Ill. It is claimed that the arrangement of this type of hoist is adaptable to many applications, such as the hoisting of building material.

The unit consists of a standard type H. G. M. worm type powered gear unit with



Gear, brake and drum used in hoist unit

a solenoid brake mounted on the extended worm shaft and a grooved drum on the slow speed worm gear shaft.

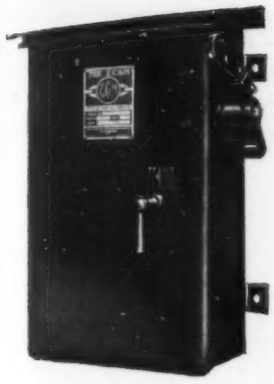


Manganese-steel crane wheel

Weatherproof and Dust-Tight Safety Switches

WEATHERPROOF AND DUST-TIGHT Type A safety switches from 30 to 600 amperes capacity are being supplied by the Electric Controller and Mfg. Co., Cleveland, Ohio. These safety switches are equipped with a fully interlocked door, making it impossible to operate the switch with the door open, or to open the door with the switch closed.

Winchell Library of Geology

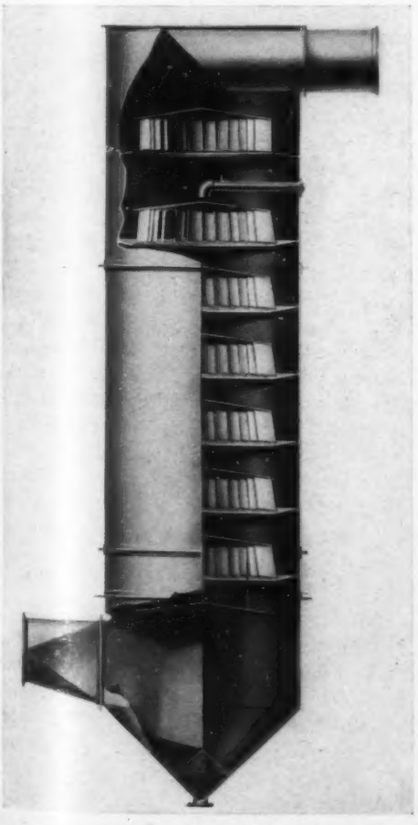


Weatherproof safety switch

Dust Collector

CLAUDE B. SCHNEIBLE CO., Chicago, Ill., announces an improved line of wet dust collectors. The collector towers, similar in external appearance to those previously offered, are now made with six dust impingement plates; the seventh of the series being designed for use as a water entrainment separator to gather the remaining moisture from the clean air before it is exhausted.

Other major design changes include a dirty-air baffle under the first impingement plate, wearing strip reinforcing, an air-directional baffle on the inlet side in the cyclone chamber, and a screened strainer on the sludge discharge line.



Wet dust collector

New Model

BUCYRUS-ERIE CO., South Milwaukee, Wis., announces the 48-B convertible shovel crane, dragline, designed to be the fastest yet in this size. Some of the special features claimed are a dragline-crane boom of alloy-steel angle cords with welded tubular cross bracing, available in lengths from 50 to 100 ft.; a high A-frame with special dragline boom suspension tackle to reduce stresses on the boom and

Excavator with new control

lessen weight at the boom point; choice of three mountings, standard, oversize and special oversize; slide-in caterpillars; 128 anti-friction bearings; arc-welded dipper handles. The control is a new feature introduced with this shovel as the "Perma-Speed" control, which is defined as (quoting the manufacturer): "The operator has in his hands at all times safe, sure, and accurate control of every motion of the machine, that the adjustments he makes 'stay put' until he changes them, that the conveniently located levers move easily at the touch of a finger, and that fatigue-slowdown need never cut the output built into this machine."

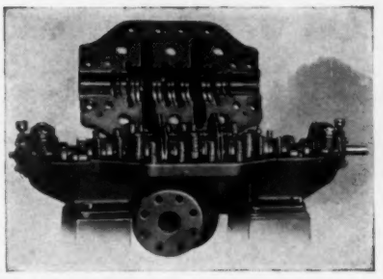
New President

Alfred Kauffmann has been elected president of Link-Belt Co., Chicago, Ill., to succeed George P. Torrence, resigned. Mr. Kauffmann was president of the company from 1924 to 1932 and, upon the election of Mr. Torrence in the latter year, he became first vice-president in charge of the company's Chicago plant operations.

Multi-Stage Centrifugal Pumps

THE new Type "MM" multi-stage pump, developed by Allis-Chalmers Manufacturing Co., Milwaukee, Wis., for heads from 400 to 1600 ft., and capacities up to 400 g.p.m., is designed along the general lines of the Allis-Chalmers Type "E" pump.

"MM" pumps are horizontal shaft, split casing, double suction, bronze fitted . . . the use of double suction runners equalizes end



Multi-stage pump

thrust and eliminates the use of internal balancing arrangements. Each stage of the casing has a spiral volute and between stages the liquid flows from one volute into an exceptionally long diffusion nozzle and then into a long sweep return bend to the inlet passages of the following stage.

Buys Phosphate Properties

Monsanto Chemical Co., Birmingham, Ala., has purchased 1200 acres of rock phosphate land in the Estes Bend section of Tennessee, and 350 acres in the Cleburne area; $260,000 in the first case and $50,000 in the second, being the purchase price. The Estes Bend tracts are about 5 miles northwest of Columbia and 10 miles northeast of Mt. Pleasant, lying along Duck river and Green Lick creek. They include part of the tracts purchased from the Tennessee Fertilizer Co. many years ago by the old Independent Phosphate Co., predecessor of the International Agricultural Corp., and afterwards abandoned and sold as farms by the latter, together with one tract belonging to the Armour Fertilizer Works and one to Hoover & Mason Phosphate Co., joining property of the Federal Chemical Co., and some of the important leases of the TVA.

It is reported that railroad access has been arranged over the tracks of the Federal Chemical Co., and the Armour Fertilizer Co., and that power for electric furnaces said to be contemplated on the lands by the Monsanto company has been arranged for with TVA with some reported arrangement for exchange of railroad and certain phosphate rights between Monsanto and TVA. The Cleburne area is about 12 miles north of Columbia and no present activity there is contemplated, it is said.

Monsanto's predecessors, the Swann Chemical Co., Federal Phosphorus Co., Southern Manganese Corp. and other Swann names, have been buying about 50,000 tons of lump rock per year from small hand miners at very cheap prices, especially during the depression, and have had a corps of engineers and chemists investigating properties all over the Tennessee field for twelve or fifteen years, and they will not likely start any active operations of their own until the cheap rock is no longer obtainable. Final transfers would indicate that such condition is now at hand.

Recent WPA Contract Prices

Chicago, Ill.: Recent contracts let by the Chicago office of WPA for crushed stone of various commercial sizes were as follows (all prices delivered on the job unless otherwise noted):

Crushed Stone

Moulding-Brownell Corp., Chicago, 312 tons limestone @ 87c; Meyer Coal and Material Co., Desplaines, 54 tons limestone @ $2.25; Dolese and Shepard, Chicago, 850 cu. yd. limestone @ $1.14, also 2100 cu. yd. @ 93c and 3000 cu. yd. screenings @ 89c; Lehigh Stone Co., Kankakee, 1000 tons limestone @ $1.60; Columbia Quarry Co., St. Louis, Mo., 1550 tons @ $1.13; Material Service Corp., Chicago, 1000 cu. yd., 3½ in. to 1 in., @ $1.67, also 963 cu. yd., 1½ in. to 1 in., @ $1.67 and 600 cu. yd. @ $1.49; Consumers Co., Chicago, 700 cu. yd. @ $1.57, also 2000 cu. yd., 1 in. to 2 in., @ $1.35 and 2000 cu. yd. screenings @ $1.18; Pontiac Stone Co., Pontiac, 500 cu. yd., 1 in. to 1¼ in., @ 85c; Ferd V. Smith Quarry, Fairfield, 3875 cu. yd. @ $2.05; L. F. Owen Co., Chicago, 1142 cu. yd., ½ in. to 1 in., @ $1.57 and 245 cu. yd. ¼ in. minus limestone screenings @ $1.47; Consumers Co., Chicago, 115,696 tons limestone @ 99c; National Stone Co., Joliet, 41 tons @ $1.81 (f. o. b. destination); Dolese and Shepard, Chicago, 5000 cu. yd. limestone screenings @ 83c; Material Service Corp., 50 cu. yd. limestone @ $1.35; Lehigh Stone Co., Kankakee, 1500 tons @ 50c (f. o. b. cars shipping point); Columbia Quarry Co., St. Louis, Mo., 315 cu. yd. @ $2.48; Moulding-Brownell Corp., Chicago, 1000 tons @ $1.42 (f. o. b. cars destination); Henry Welch and Son Co., Springfield, 1545 tons chips @ 49c (f. o. b. cars, shipping point); Consumers Co., Chicago, 800 cu. yd. @ $1.525 (f. o. b. cars destination); Elmhurst-Chicago Stone Co., Elmhurst, 325 cu. yd. screenings @ $1.85; Wisconsin Lime & Cement Co., Chicago, 437½ tons @ $1.00; Charles Stone Co., Mt. Vernon, 700 cu. yd. @ $1.98; Moulding-Brownell Corp., Chicago, 280 cu. yd. @ $1.73; Material Service Corp., Chicago, 1075 tons @ 92c; Dolese and Shepard, Chicago, 1300 cu. yd. @ $1.23; Mississippi Lime and Material Co., Alton, 900 tons @ $1.405 (f. o. b. cars destination); Momence Stone Products Co., Momence, 1488 cu. yd. @ $1.68; Columbia Quarry Co., St. Louis, Mo., 600 tons @ $1.38; R. E. Roach, Wilmington, 768 cu. yd. @ $1.34; Dolese and Shepard, Chicago, 572 tons @ 91c; Consumers Co., Chicago, 620 tons @ $1.10 and 140 tons screenings @ $1.10.

Sand and Gravel

Wisconsin Lime and Cement Co., Chicago, 232 tons washed sand @ $1.11; W. M. Gibson Co., Bloomington, 970 cu. yd. 1½-in. minus pit run gravel @ 30c; Material Service Corp., Chicago, 150 cu. yd. ¾-in. to ¼-in. gravel @ $1.83; Frenzel Bros. Co., Chicago, 2000 cu. yd. 4-in. minus pit run gravel (f. o. b. pit or stock pile) @ 20c; Ethel T. Coss, El Paso, 625 cu. yd. 1½-in. minus pit run gravel (f. o. b. pit) @ 30c; Material Service Corp., Chicago, 200 cu. yd. No. 1 torpedo sand @ $1.88 and 150 cu. yd. gravel @ $1.41; Wayne County Limestone Co., Fairfield, 900 cu. yd. ¾-in. to ¼-in. gravel @ $1.25; L. S. Backus, Harvard, 1500 cu. yd. 1½-in. to ¼-in. pit run gravel @ 15c; Glen Strole, Temalco, 6000 cu. yd. 1½-in. minus pit-run gravel @ 7½c; Crawford Sand and Gravel Co., Oblong, 5728 cu. yd. ¾-in. to No. 4 gravel @ 58c; Dees Bros., Lawrenceville, 2000 cu. yd. standard gravel @ 51c; Lee Pleasant Black Pit Gravel Co., Palestine, 1250 cu. yd. 2-in. minus pit-run gravel @ 15c; George F. Keller, Riverside, 400 cu. yd. No. 2 torpedo sand @ $1.48; Prothero and Willis, Bloomington, 1000 cu. yd. 1½-in. minus pit-run gravel @ 39c; Bishop, Grady and Coultas, Exeter, 4050 cu. yd. 1½-in. minus gravel @ 40c; Mount Carmel Sand and Gravel Co., Mount Carmel, 2000 cu. yd. gravel, ¾-in. to No. 4, @ 90c; Dees Bros., Lawrenceville, 2500 cu. yd. ¾-in. to No. 4 gravel @ 55c; Maunie Sand and Gravel Co., Maunie, 925 cu. yd. ¾-in. to No. 4 gravel @ $1.90; Earl T. Cox, Chicago, 3004 cu. yd. pit-run gravel (f. o. b. pit) @ 10c; Prothero and Willis, Bloomington, 3000 cu. yd. pit-run gravel @ 39c; D. W. Beckwith, Danville, 2000 cu. yd. 1½-in. minus gravel with 15% clay (f. o. b. pit) @ 20c; Maunie Sand and Gravel Co., Maunie, 2324 cu. yd. ¾-in. to No. 4 gravel @ $1.60; Harry Riley, Shelbyville, 2916 cu. yd. pit-run gravel @ 90c; C. H. Miller, Sheldon, 3500 cu. yd. pit-run gravel @ 30c; James Millikan Estate and W. J. Cottle, Decatur, 5000 cu. yd. pit-run gravel (f. o. b. pit) @ 9c; W. E. Denny, Sorento, 5000 cu. yd. pit-run gravel (f. o. b. pit) @ 10c; Moulding-Brownell Corp., Chicago, 22,000 cu. yd. 1-in. to ¼-in. gravel (f. o. b. plant) @ 30c; Williams Material Co., Streator, 1043 cu. yd. 1-in. minus gravel (f. o. b. stock pile) @ 60c; Oliver Holmes, Lena, 400 cu. yd. pit-run gravel (f. o. b. pit) @ 70c; Roy Brading, Oakland, 4440 cu. yd. gravel (f. o. b. pit) @ 20c; Novaculite Paving Co., Tamms, 875 tons gravel @ $1.35; Charles Stone Co., Mount Vernon, 825 cu. yd. ¾-in. minus gravel @ $1.94; Metropolis Sand and Gravel Co., 555 cu. yd. grade 3 specification gravel @ $1.98; Mount Carmel Sand and Gravel Co., Mount Carmel, 4000 cu. yd. gravel @ $1.80; Albert Rodgers, Brockton, 2812 cu. yd. pit-run gravel @ $1.40; E. J. Miller, Mohamet, 17,764 cu. yd. pit-run gravel @ 9.9c; Durrell Batterton, Colfax, 2437 cu. yd. pit-run gravel @ 40c; E. W. Vanzant, Brockton, 2245 cu. yd. pit-run gravel @ $1.93; Builders Supply Co., Galesburg, 1800 tons grade A, ½-in. to ¼-in. gravel @ $1.01; Vernon Schrader, Sterling, 1450 cu. yd. gravel @ $1.23; James Millikan Estate, Decatur, 5000 cu. yd. pit-run gravel @ 15c; C. A. Mayes, Albion, 2344 cu. yd. gravel @ $1.25; Ransom Lewis, Danville, 1800 cu. yd. pit-run gravel (f. o. b. pit) @ 24c; Eastwood Sand and Gravel Co., Grayville, 1000 cu. yd. gravel @ $1.75; Mount Carmel Sand and Gravel Co., Mount Carmel, 2600 cu. yd. gravel @ $1.99; Shelby Loan and Trust Co., Shelbyville, 3500 cu. yd. pit-run gravel @ 10c; Johnston Lumber Co., Kewaunee, 1280 tons grade A washed sand @ $1.40; Elmer Larson, Rochelle, 6000 cu. yd pit-run gravel @ 75c; Charles Stone Co., Mt. Vernon, 286 cu. yd. gravel @ $1.98; M. G. Ellsworth, Bloomington, 2500 cu. yd. 1½-in. minus gravel @ 50c; Metropolis Sand and Gravel Co., Metropolis, 370 cu. yd. gravel @ $2.09 (f. o. b. cars, destination); Lee Pleasant Black Pit Gravel Co., Palestine, 3750 cu. yd. pit-run gravel @ 10c (price at pit); Walter Hines Truck Co., Maunie, 810 cu. yd gravel @ $2.00; Dipper Bros., Decatur, 750 cu. yd. washed gravel @ $1.60 (f. o. b. cars, destination); Material Service Corp., Chicago, 700 cu. yd. gravel @ $1.83 (f. o. b. cars, destination); Walter Hines Truck Co., Maunie, 399½ cu. yd. gravel @ $2.19; Wabash Sand and Gravel Co., Terre Haute, Ind., 110 tons sand @ $1.15 (f. o. b. cars, destination); Moline Consumers Co., Moline, 275 cu. yd. gravel @ $1.96 (f. o. b. cars, destination); Sonnemann and Holland Lumber Corp., Hillsboro, 140 cu. yd. washed sand @ $2.43; Jesse L. Keen, Milford, 9800 cu. yd. pit-run gravel (f. o. b. stock pile @ 27c; Joe H. Puckett, Fairfield, 2000 cu. yd. gravel @ $1.95; Wabash Sand and Gravel Co., Terre Haute, Ind., 210 tons gravel @ $1.35 (f. o. b. cars, destination); Schuck and Son, Springfield, 186 cu. yd. gravel (f. o. b. cars, destination) @ $2.142; Williams Material Co., Streator, 5200 cu. yd. pit-run gravel @ 30c; Prothero and Willis, Bloomington, 6170 cu. yd. pit run gravel @ 49c; Mt. Carmel Sand and Gravel Co., Carmel, Ill., 761 cu. yd. gravel @ $1.24; Geo. Tredway, St. Francisville, 1500 cu. yd. gravel @ $1.60; Allendale Gravel Co., Allendale, 1000 cu. yd. gravel @ $1.35; Anderson-Theobald Co., Vincennes, Ind., 897 cu. yd. gravel @ $1.55; Vincent Spencer Sand and Gravel Co., Belvidere, 1200 cu. yd. gravel @ 60c (f. o. b. stock pile); Consumers Co., Chicago, 656 cu. yd. gravel @ $1.10; McGrath Sand and Gravel Co., Lincoln, 300 cu. yd. washed gravel @ $1.61; Ira M. Dudley, Champaign, 724 tons bank sand @ $1.35; Harry Carlton, Sterling, 4500 cu. yd. crushed gravel @ 95c; Meyer Coal and Material Co., Des Plaines, 643 cu. yd. pit gravel @ $1.80; J. E. Walsh, Albion, 1000 cu. yd. gravel @ $1.86; Crawford Sand and Gravel Co., Oblong, 1660 cu. yd. gravel @ 55c; Lenahans and Konen, Inc., Vincennes, Ind., 4000 cu. yd. Novaculite gravel @ 50c.

Ready-Mixed Concrete

E. E. Lilly and Son, Decatur, 709 cu. yd. @ $8.90; 150 cu. yd. @ $9.97; 2200 cu. yd. @ $9.76; 3000 cu. yd @ $9.75.

THE INDUSTRY

New Ineorporations

Fresh Water Rock and Sand Co., Miami, Fla.; 100 shares, $100 par value. Incorporators are J. M. Deer, N. W. Groves and C. S. Ellis.

Anchor Concrete Products, Inc., Buffalo, N. Y.; building materials; $15,000; Mursett C. Luckner, Stock Exchange Bldg., New York, N. Y.

Louisville Sand and Gravel Co., Louisville, Ky.; capital $100,000. Incorporators are B. H. and Bess H. Collings and Steve Click, 2115 Speed.

Mid-West Rock Products Corp., Portland, Ind.; reorganization; capital stock 4000 shares preferred of $25 par value and 5000 shares common no par value.

Maribel Gravel, Inc., Denmark, Wis.; to deal in gravel, crushed stone, etc.; 500 shares at $100 each. Incorporators are W. W. and H. A. Bruss and Ed Schuster.

Tuskahoma Gravel and Materials Co., Tuskahoma, Okla.; capital stock $5000. Incorporators are Edward M. Box, Dan Welch and Solus Brooks, Oklahoma City.

Central Gravel Co., Inc., 33 N. La Salle St., Chicago, Ill.; to deal in sand, clay and rock matter; 200 shares p. v. common. Incorporators are Margaret Barnes, 210 N. Kolin St.; John Grimberg, and Sally Wolff.

Orleans County Limestone Co., Inc., Medina, N. Y.; stone products; $250,000. Incorporators are Wm. J. and Mary Gallagher, 210 W. Center St., Medina, N. Y. and John H. Dickie, 582 Walnut St., Lockport, N. Y.

Hornell Gravel Corp., Salamanca, N. Y., is a consolidation of Hornell Gravel Corp., Springville Sand and Gravel Co. and Sterrett Sand & Gravel Co., Inc; capital, $200,000. Directors are H. E. Bunce, 19 Seneca St., Hornell; Louis Klein, Cleveland, Ohio; and Lee H. Kessler, 169 Main St., Springville.

Personals

George A. Russell has been appointed comptroller of Canada Cement Co., Ltd., Montreal, Que.

H. K. Shideler resigned as of March 15 as county engineer at Great Bend, Kan., and accepted a position with the Portland Cement Association, Chicago, Ill.

William T. Rossiter, Cleveland, Ohio, has been elevated from vice-president and general manager to president of Cleveland Builders' Supply Co. He succeeds the late John A. Kling.

Robert B. Henderson, president, Pacific Portland Cement Co., and **William Wallace Mein,** president, Calaveras Cement Co., are members of the board of American Trust Co., San Jose, Calif.

R. K. Neill, general manager of the Spokane Portland Cement Co., Inc., Spokane, Wash., is president of a new British Columbia gold enterprise being developed by Cardinal Mining and Development Co., Ltd.

Mae O. Gillen, president, Waukesha Lime and Stone Co., Waukesha, Wis., is one of the several women listed in a new "Who's Who" which portrays the outstanding figures in commerce and industry in this country.

A. W. Stubbeman, who has served as superintendent of the quarry and plant of the Louisiana Stone and Lime Corp., Winnfield, La., has been promoted to general superintendent of both the Winnfield and the Easton plants.

John A. Blank, consulting chemist, Cementos Atoyac, S. A., and consulting engineer in charge of operations of the Cement Process Corp., is visiting the plant of Cementos Atoyac, S. A., at Pueblo, Mexico, where he is assisting in the development of new products.

Arthur Andersen, Chicago, Ill., head of the firm bearing his name, has been elected a director of the United States Gypsum Co. to fill the term expiring in 1938 which was held by George R. King, deceased. The gypsum company also has three new vice-presidents: **W. L. Keady,** general manager of operations; **J. H. Nold,** chief engineer; and **J. P. Sanger,** director of purchases.

Obituaries

Jacob J. Haarer of Ray Sand and Gravel Co., Detroit, Mich., died early in March.

Al Hamel, manufacturer of cement blocks, Birmingham, Mich., died February 19 of tuberculosis.

D. M. Filler, 60, vice-president and general sales manager of the Urbana Sand and Gravel Co., Urbana, Texas, died recently.

Oscar L. Thomas, 62, former assistant superintendent of the Smoot Sand and Gravel Corp. plant, Washington, D. C., died February 22 of pneumonia.

Henry Baker Farrar, 62, president of The Cohutta Talc Co., died of heart attack March 2 at his home in Dalton, Ga. He was also vice-president of the Empire Talc and Lumber Co., Chatsworth, Ga.

Raymond Dill, 55, for 13 years treasurer of Allis-Chalmers Manufacturing Co., Milwaukee, Wis., died suddenly of a heart attack in his office March 17. He had been with Allis-Chalmers since 1905. His first connection was with Westinghouse Electric Co.

James L. Medler, an active figure in the cement industry for 35 years, died March 9 in Brooklyn, N. Y., following a heart attack. He was assistant treasurer and assistant secretary of Universal Atlas Cement Co., New York City, and formerly was with the Atlas Cement Co.

Urbane W. Hird, 69, until recently head of the credit department of the *Cleveland Plain Dealer,* Cleveland, Ohio, died March 5 at his home in Lakewood, Ohio. Early in his career he worked for eight years with Kelley Island Lime and Transport Co. at Kelley Island, starting from the bottom and working up to superintendent.

Quarries

Pleasant Hill, Mo.: The city recently received its portable crusher.

Mercer, Mo.: Marion township recently was planning to buy a new rock crusher.

Del Norte, Colo.: A rock quarry, idle five years, has been reopened to produce building stone.

Morganton, N. C.: The town council early in March authorized purchase of a rock crusher for $3500.

Paola, Kan.: Five quarries have been opened in Miami county to produce material for WPA projects.

Harrisonville, Mo.: The rock quarry on the Mrs. George Bird property is producing material for WPA street paving.

Toccoa, Ga.: Stephens county recently leased a rock quarry near Toccoa from Nichols Construction Co. of Atlanta.

Jameson, Mo.: A new rock crusher, bought by the Grand River township board, is operating on the Grover C. Hoyle farm.

Newton, N. C.: A full crew is operating a WPA quarry for street surfacing material. The street project involves about $22,000.

Stone Mountain, Ga.: A large crusher was recently put up at the quarry site of Stone Mountain to produce material for PWA projects.

Erie, Kan.: Rock from the Robert Coover farm is being quarried and crushed for the WPA road program south of Fairview and vicinity.

Nebraska City, Neb.: The new Otoe county crusher originally shipped to Julian for the Auburn quarry has been shipped to Douglas.

Appleton, Wis.: A new $5000 WPA stone crushing project for farm-to-market roads was recently begun at the Murphy quarry, Black Creek.

Brunswick, Mo.: Township and city WPA projects were started recently on the Ed Watkins farm and the Tony Miller quarry for road materials.

New Franklin, Mo.: The new 15-cu.yd. rock crusher recently purchased by the Special Road District is operating at the quarry on the Klusemeyer land.

Paris, Tenn.: Farmers of Henry county are contemplating opening a limestone quarry near Sulphur Well and obtaining a crusher to produce agricultural limestone.

Chickasha, Okla.: Plans have been made for a stone quarry at the twin hills northeast of Anadarko to be operated in connection with the Caddo county projects.

Liberal, Mo.: Rock for a WPA road project is being picked from the surface of the Suiter-Justice farm, and a new crusher, it has been reported, is to be installed.

Lathrop, Mo.: The first WPA project in this community was started recently when the quarry on the Fred Gall farm was opened. The crusher has been set up.

Pawhuska, Okla.: A city-leased quarry on the Ed Souligny place is being operated to produce material for building of an armory.

Columbus, Kan.: The county rock crusher has been placed south of McCune and stone is being crushed for road surfacing under a WPA project.

Marceline, Mo.: The Marceline Special Road District recently purchased a rock crusher and is producing material for a WPA project for surfacing 13 miles of road.

Canon City, Colo.: Funds for operating the Fremont county crusher for street surfacing purposes were recently released by WPA. The crusher produces 125 tons a day.

Centralia, Mo.: A quarry 17 miles southwest of town has been leased through the Chamber of Commerce and it is reported that a new crusher will be placed there soon.

The Trap Rock Co. plant at Dresser Junction, Wis., started crushing rock for road work and construction early in March with a double shift of 45 men for day and night crews.

Waverly, N. Y.: A quarrying and stone crushing project for the Town of Barton was recently started to produce material for roads. A WPA quarry has also been opened south of Bath.

Penry Stone Co., Radnor, Ohio, was recently awarded a contract by the federal government to supply 4000 tons of agricultural limestone for the Crannery Dry Creek project in Knox county.

Keosauqua, Iowa: Davis county has leased the G. M. Clayton farm and is quarrying and crushing stone for market roads. It is also planned to surface a road from the county line to the quarry.

Fairfield, Iowa: Rock crushing machinery has been set up at the Jefferson county rock quarry on the O. J. Clarridge farm south of Libertyville and the material produced is being stock-piled at the quarry.

Emporia, Kan.: A new quarrying and rock crushing WPA project 13 miles southwest of Emporia was opened in March to furnish surfacing material for 15 miles of road in Pike and Center townships.

Wakefield, Kan.: A big new state rock crusher shipped from Salina, has been set up west of town. Contract for re-sanding Highway 15 through Clay county was awarded recently to Don Wheelock.

Ross Markel, Ashland, Ohio, is operating a crusher behind his auto repair shop and garage to crush stone from the old L. A. & S. bed for township roads. The work is being supervised by township trustees.

Steubenville, Ohio: The municipal recreation department has reopened the old quarry on the Castner estate, below Belleview park, to produce material for an improvement program. The city pays 15c a ton.

Marshall, Mo.: Excessive overburden at the old quarry on Salt Fork creek, near the Wilton Springs crossing, has forced the Marshall Special Road District to open a new quarry 1½ miles southeast of the old site.

Burlington, Iowa: The county has purchased a new large rock crusher to be placed at the Rocky Ford quarry and has transferred the crusher previously used there to the Siefken quarry which will soon be opened.

Armstrong, Mo.: The new crusher purchased by the Armstrong Special Road District has been placed at the Jim Pitts hill on the farm of Charles Brooks, and is crushing rock for the 3-mile road east from the Chapel Cemetery.

Garnett, Kan.: Rock obtained from a crusher at the Ted Olden gravel pit, northwest of Lone Elm, is being used to surface a road extending two miles south from Lone Elm to the Allen county line—the fifth WPA project in the county.

Logan, Iowa: WPA has allocated $2700 for the removing and crushing of 10,000 cu. yd. of rock for road purposes from the Peckenpaugh quarry southeast of town. Harrison county will pay Frank Peckenpaugh probably 10c a cu. yd. A crusher is to be purchased.

Chariton, Iowa: Crushing of agricultural limestone was begun in March at the quarry established south of Melrose by the Lucas County Soils Association and the local CCC camp. Petitions are being sent to Washington urging the maintenance of the camp after April 1.

The Decatur County Limestone Co., Lamoni, Iowa, recently signed a contract with the Decatur County Soils Conservation Association to furnish limestone to the association for a period of six months. However,

the labor at the quarry is being furnished by the government.

Maysville, Mo.: DeKalb county recently purchased a rock crusher for $3000.

Chanute, Kan.: Quarrying is in process to produce material for an East Main street WPA paving project.

Nowata, Okla.: A crusher was recently put in operation to produce material for the road project in the Glen Oak district.

Bartlesville, Okla.: WPA labor is operating the quarry near the city cemetery to obtain construction material for the new armory.

Stanberry, Mo.: Two rock quarries, one near King City and one near Stanberry, were opened recently as WPA projects in Gentry county.

Viola, Wis.: The Richland county agricultural committee has opened two more quarries with WPA labor. This makes six quarries producing agricultural limestone for local farmers at $1.25 per ton.

Floris, Iowa: The rock quarry east of Floris has been abandoned and the rock crusher moved to Van Buren county, where workers are opening a new quarry near Lebanon to produce road material.

Kansas City, Kan.: A city quarry 28 ft. in thickness, all the material of which is suitable for building purposes, has been opened on Adams St. in the Greystone Hill district. Concession stands in the city's parks will be erected.

Maryville, Mo.: The Nodaway County WPA organization sped up production early in March, at its three rock quarries, by working 24 hours a day in three 8-hour shifts. Pumpkin Center quarry is to produce 2300 cu. yd. of rock; Bridgewater quarry, 2500 cu. yd., and the Parnell quarry 4400 cu. yd.

Excelsior Springs, Mo.: The Clay county court recently sold to the Excelsior Springs Special Road District a large portable rock crusher that the court purchased early in the fall. The Special Road District has opened up its quarry west of town on the Houston Allen farm. It formerly owned a crusher jointly with the city, but sold its interest to the city.

Sand and Gravel

Missouri Gravel Co., La Grange, Mo., resumed operation at the end of February after a shutdown since before Christmas.

DeSoto Kaw River Sand Co., has moved its main offices to Lawrence, Kan. The Company's plant at Williamstown has been moved to Ellsworth, Kan.

Sac City, Iowa: The city council early in March purchased a 43-acre tract containing gravel deposits in the northeast part of town from the Pitstick estate for $2586.

Mt. Carmel Sand and Gravel Co., Mt. Carmel, Ill., resumed operation for the year early in March. Gravel from Lower White river is being shipped to Fairfield.

Western Indiana Gravel Co. South Bend, Ind., and the New York Central Railroad are seeking permission to lay a switch track leading into the gravel company's property.

The Louisville-Plattsmouth district of the Lyman-Richey Sand and Gravel Co. at a recent officers' meeting in Omaha, Neb., was given the safety first award of the company for the best showing of any of its districts.

Independent Gravel Co. reports that its plant on South Pine St. Road, Carterville, Mo., was looted of an 18-in. conveyor belt and 15 conveyor-idlers. The plant has been out of operation for some time, with no watchman, and it is not known just when the theft occurred.

Cement Products

Concrete Products Co., Eddystone, Penn., was damaged by fire February 21.

Slag

The Cashion Slag Co., North Scottdale, Penn., resumed operation March 16 after the winter shutdown.

Manufacturers

Van Auken-Ragland, Inc., advertising agency, Chicago, Ill., will move May 1 from the Daily News Bldg. into larger quarters in the Twenty North Wacker Bldg.

C. F. Burgess Laboratories, Inc., Madison, Wis., has created the office of chairman of the board and has elected C. F. Burgess to this office. Arba B. Marvin of New York has been elected president.

Consolidated Products Co., New York, N. Y., recently purchased the $10,000,000 Spreckels Sugar Corp. plant on Vark street, Yonkers, N. Y., and is liquidating all the equipment and buildings.

Caterpillar Tractor Co., Peoria, Ill., announces that M. Rogers has been promoted to general factory manager. James R. Munro succeeds Mr. Rogers as factory manager of the tractor division.

Hardinge Co., Inc., York, Penn., announces through Harlowe Hardinge, vice-president, who has just returned from a trip to San Francisco and Vancouver, B. C., that activity in mining machinery is improving.

General Electric Co., Schenectady, N. Y., has promoted Harry A. Winne to manager of the mining and steel mill section of the industrial department. John C. Miller, heretofore in charge of the aeronautical section, has been appointed manager of sales for that section.

The Jessop Steel Co., Washington, Penn., has made license arrangements with Cleveland Twist Drill Co., Cleveland, Ohio, holder of the patent covering Mo-Max type of molybdenum high-speed steel and is producing the same kind of steel under the trade name of "Mogul."

Nordberg Manufacturing Co., Milwaukee, Wis., announces that Charles E. Wood, formerly of Baxter Springs, Kan., has become associated with its organization. Mr. Wood developed the sand tank and the auto-vortex classifier which bear his name, and these two products will now be sold and built by Nordberg.

The Cooper-Bessemer Corp., Mt. Vernon, Ohio, has been awarded a contract by the Panhandle Eastern Pipeline Co., Kansas City, Mo., for fourteen twin-tandem gas-engine-driven compressor units. The order calls for twelve 1300-hp. units and two 1000-hp. units. The engines will pump natural gas from the Texas Panhandle to Detroit, Mich.

Timken Steel & Tube Co., Canton, Ohio, announces the promotion of S. D. Williams to the position of director of sales, with headquarters in Canton. Donald P. Hess, executive assistant to the president, has resigned as of April 1 and will devote himself to directing the Ebco Manufacturing Co., a concern making plumbing fixtures, metal cabinets and partitions, Columbus, Ohio, in which he has recently purchased a substantial interest.

Trade Literature

Sand Pump. Bulletin 159, 4 pages, deals with Type K, a new type of sand pump. MORRIS MACHINE WORKS, Baldwinsville, N. Y.

Pellet Powder. A booklet describes Pellet "D," which features reduced smoke and fumes and great economy. HERCULES POWDER CO., Wilmington, Del.

Sharpeners. For mines and quarries, the IR-54 drill-steel sharpener and the 27F oil furnace are introduced in a 4-page leaflet. INGERSOLL-RAND, New York, N. Y.

Bearings. A wide scope of ball and roller bearing information is covered in a 76-page edition of Engineering Data Sheets. SKF INDUSTRIES, Inc., Philadelphia, Penn.

Busters. A 4-page illustrated two-color bulletin describes the construction and performance of three new busters, K-9, K-10 and K-11. SULLIVAN MACHINERY CO., Chicago, Ill.

Asphalt Plants. Tower type portable asphalt plants are illustrated and described in Photo Bulletin T-248, 20 pages, and in Bulletin T-247, 4 pages. HETHERINGTON & BERNER, INC., Indianapolis, Ind.

Screens. Catalog 601, 24 pages, illustrates and describes the power and balance of Tyler-Niagara circle-throw screens. Ty-Rod and Ton-Cap are among the screenings shown. THE W. S. TYLER CO., Cleveland, Ohio.

Rubber Products. A 56-page general catalog, printed in two colors in file-jacket size, describes belting hose, fittings, matting and tread, abrasive wheels, etc., with prices and information tables. MANHATTAN RUBBER MFG. DIVISION, Passaic, N. J.

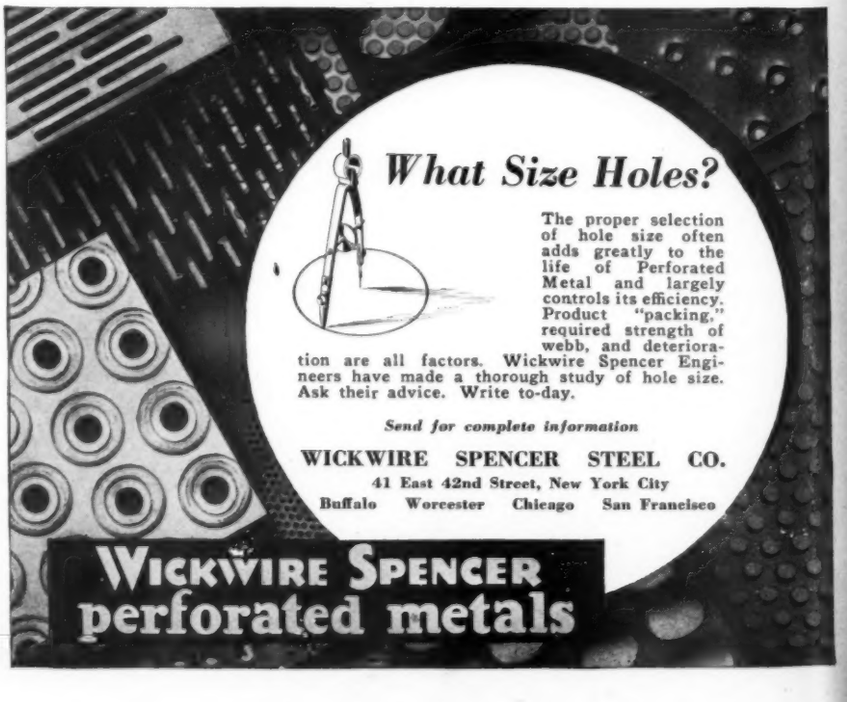
"Lubrication." The February, 1936, issue of this monthly features a story on "Wire Rope—Design, Construction and Lubrication." It also has an article on "Belt Conveyors." THE TEXAS CO., New York, N. Y.

"Rivers of Dirt." A 16-page bulletin tells in pictures and in words the story of the Grand Coulee dam, with emphasis on the conveyors used in this "world's greatest conveyorized construction project." THE JEFFREY MANUFACTURING CO., Columbus, Ohio.

Lime Plant Equipment. A new circular shows photographs of installations employing "Arnold" vertical type lime kilns, "Ward" automatic coal feeders, "Weber" batch type lime hydrators, "McGinty" shaking grates, and other types of Arnold & Weigel service. ARNOLD & WEIGEL, Woodville, Ohio.

Spray Equipment. A two-color, 32-page booklet, No. AD-114, gives prices and descriptions of new additions to the line of spray equipment, as well as outlining the entire line, including descriptions, prices and illustrations of nozzles, compressors, pressure containers, etc. BINKS MANUFACTURING CO., Chicago, Ill.

General Catalog No. 35. Power transmitting and material handling equipment for quarries and sand and gravel plants is described, with illustrations, specifications and prices. The last section of this 315-page bound book is devoted to general engineering data useful for permanent reference. DIAMOND IRON WORKS, INC., Minneapolis, Minn.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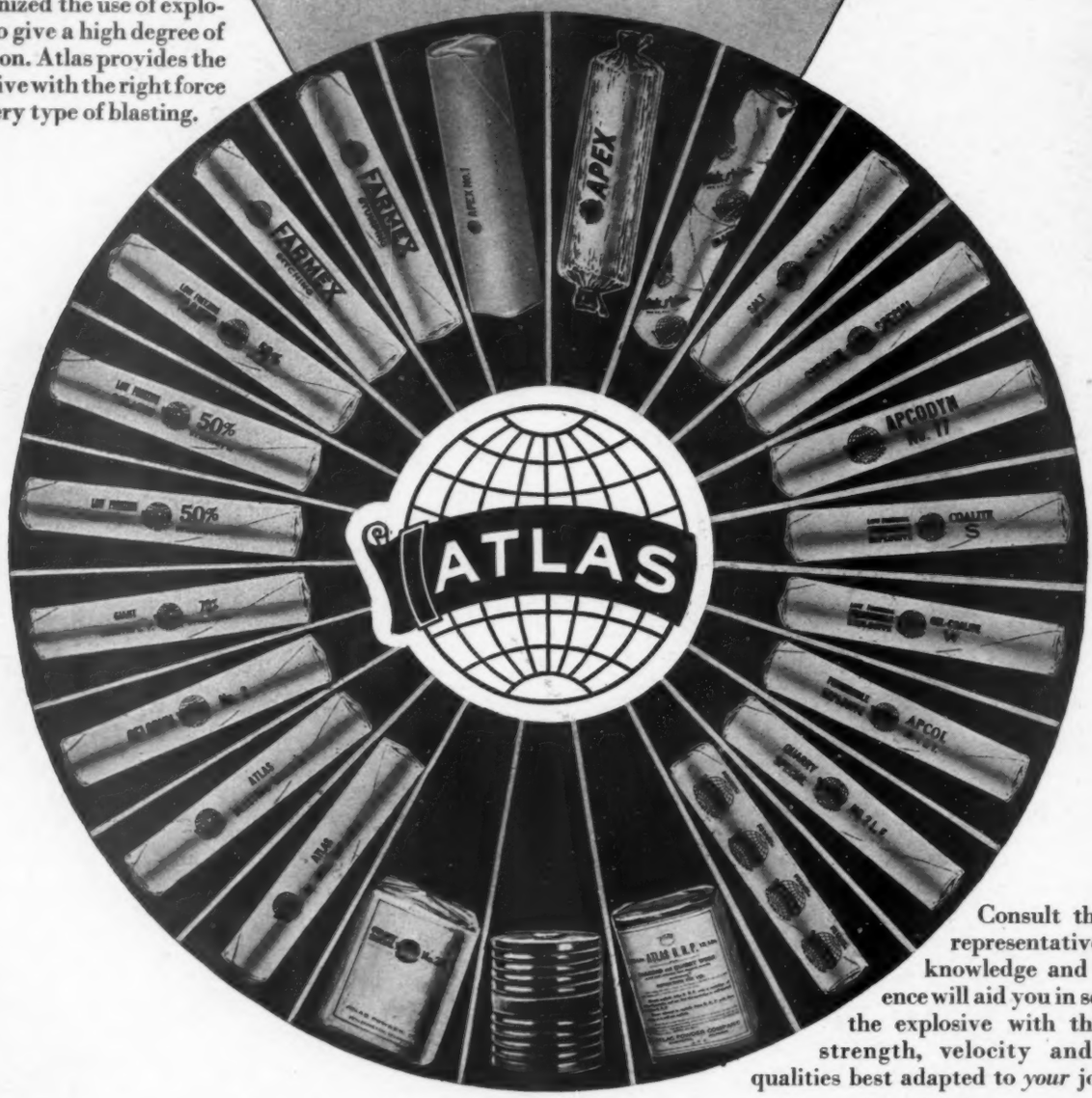

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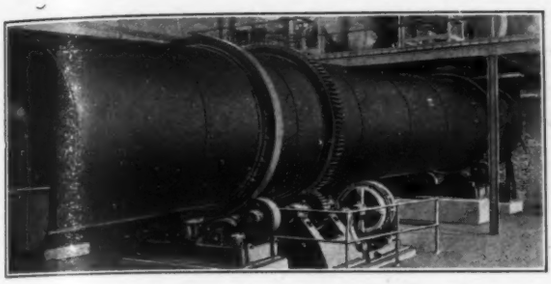

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How 30 Year Old Dryers Help You Today

Thirty years ago Ruggles-Coles Dryers were built right—as proof—many are still in service.

We see today where they could have been better.

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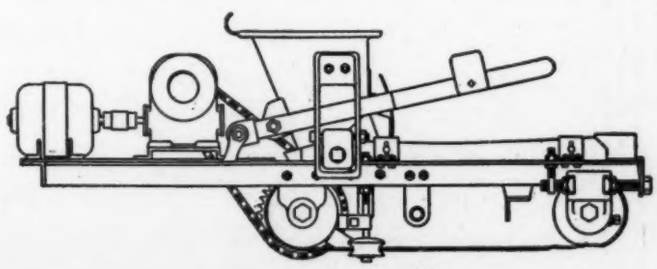

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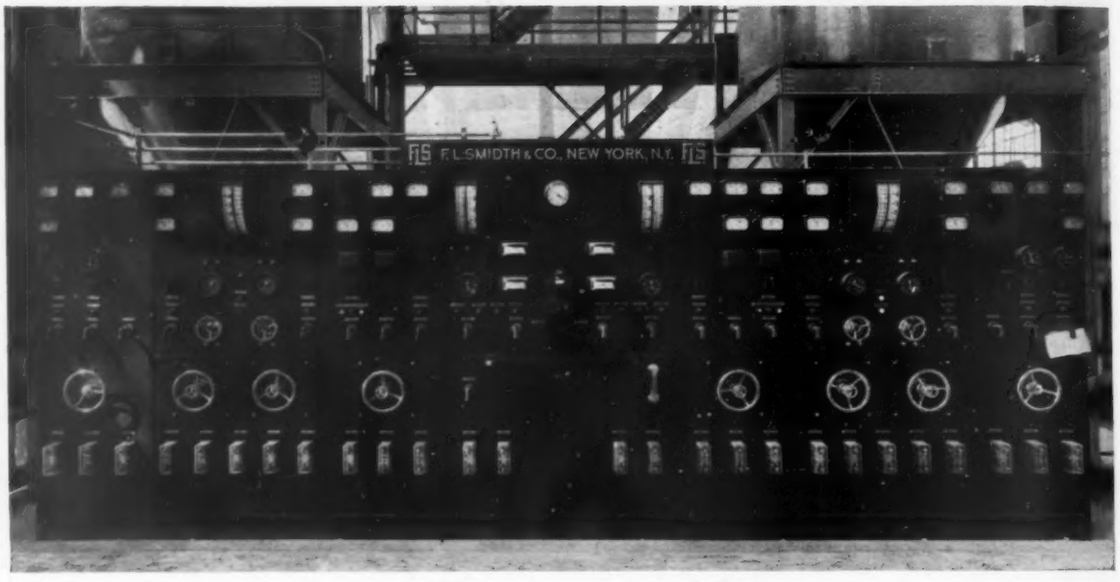

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For alphabetical index, see page 2

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Calcium Chloride Ass'n

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Hardinge Company, Inc.
F. L. Smidth & Co.

Airveyor
Fuller Co.

Air Compressors
Fuller Co.
Nordberg Mfg. Co.
F. L. Smidth & Co.
Traylor Eng. & Mfg. Co.

Air Filters
Fuller Co.

Air Separators
Bradley Pulverizer Co.
Hardinge Company, Inc.
Raymond Bros. Impact Pulv. Co.

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Firestone Tire & Rubber Co.

Automatic Weighers
Richardson Scale Co.

Babbitt Metal
Joseph T. Ryerson & Son, Inc.

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Lima Locomotive Works, Inc. (Ohio Power Shovel Co.)

Backfillers
Austin-Western Road Machy. Co.
Bucyrus-Erie Co.
Harnischfeger Corp.
Lima Locomotive Works, Inc. (Ohio Power Shovel Co.)

Bagging Machinery
Richardson Scale Co.

Ball Bearings
S K F Industries, Inc.

Balls (Grinding, See Grinding Balls)

Balls (Tube Mill, etc.)
Allis-Chalmers Mfg. Co.
Hardinge Company, Inc.
F. L. Smidth & Co.

Bar Benders and Cutters
Koehring Co.

Batchers
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Batteries
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Bearings
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Link-Belt Co.
Joseph T. Ryerson & Son, Inc.
S K F Industries, Inc.
Timken Roller Bearing Co.

Bearings (Anti-Friction)
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Timken Roller Bearing Co.

Bearings (Roller)
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Bearings (Tapered Roller)
Timken Roller Bearing Co.

Bearings (Thrust)
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Timken Roller Bearing Co.

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Flexible Steel Lacing Co.

Belting
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Robins Conveying Belt Co.

Belt Lacing (Steel)
Flexible Steel Lacing Co.

Belting (Elevator and Conveyor)
B. F. Goodrich Co.
Goodyear Tire & Rubber Co., Inc.
Hewitt Rubber Corp.

Belting (Metal, Conveyor, High and Low Temperature)
Wickwire-Spencer Steel Co.

Belting (V Type)
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Goodyear Tire & Rubber Co., Inc.

Belting (Transmission)
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Belts (Fan)
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Fuller Co.
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Link-Belt Co.
Robins Conveying Belt Co.
Sprout, Waldron & Co., Inc.
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Traylor Eng. & Mfg. Co.

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Atlas Powder Co.

Blasting Supplies
Atlas Powder Co.

Blasting Powder (See Powder, Blasting)

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S K F Industries, Inc.
Timken Roller Bearing Co.

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Hug Co.

Boilers
Babcock & Wilcox Co.
Combustion Engineering Corp.

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Firestone Tire & Rubber Co.

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Hayward Company
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Wellman Eng. Co.

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Buckets (Dredging and Excavating)
Harnischfeger Corp.

Buckets (Elevator and Conveyor)
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Ensign-Bickford Co.

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Cars (Quarry and Gravel Pit)
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Cement Pumps
Fuller Co.
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Chain Belt Co. (Concrete)

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Link-Belt Co.

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B. F. Goodrich Co.
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Chutes and Chute Liners
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Good Roads Machy. Corp.

Chutes for Minimizing Segregation
Robins Conveying Belt Co.

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Allen Cone & Machy. Corp.
Hardinge Co., Inc.
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Straub Mfg. Co., Inc.

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Bonnot Company

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Williamsport Wire Rope Co.

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Compressors (See Air Compressors)

Concrete Slab Raising Equipment (Mud-Jack)
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Earle C. Bacon, Inc.
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Chain Belt Co.
Fuller Company
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Lewistown Fdy. & Mach. Co.
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Conveyoweighs
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Koehring Co.
Lima Locomotive Works, Inc. (Ohio Power Shovel Co.)
Link-Belt Co.
Thew Shovel Co. (Electric, Gasoline and Steam)

Cranes (Excavator
Koehring Co.

Cranes (Overhead Traveling Electric)
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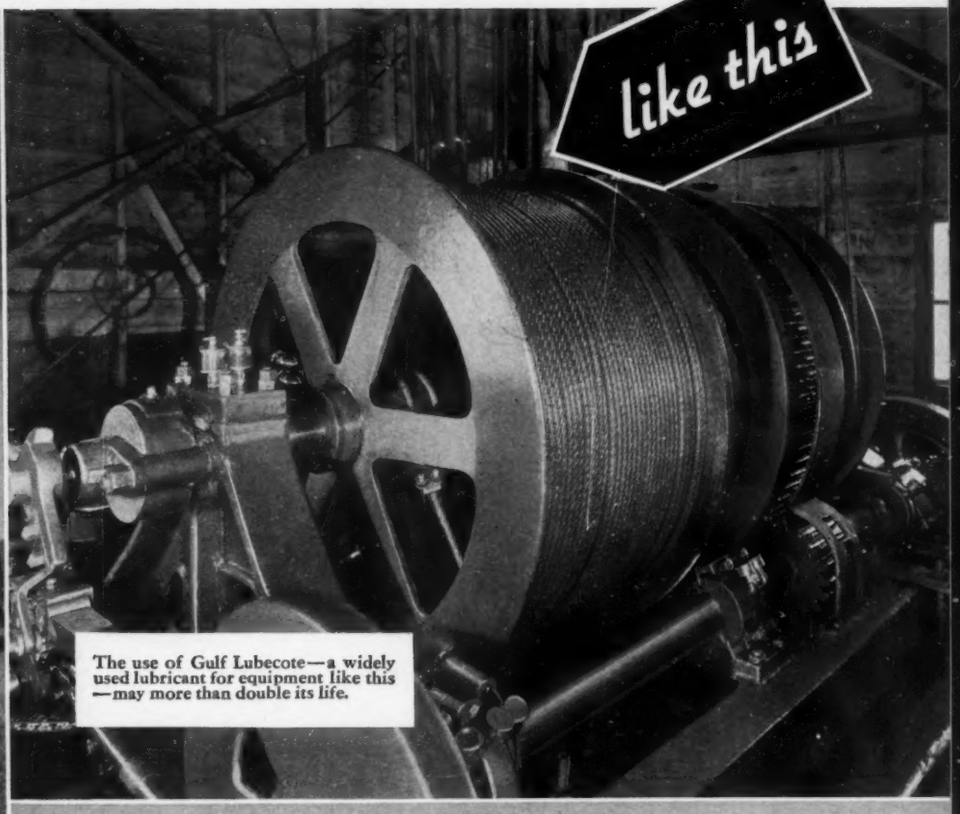
For Diesel engines, open gears, cables and all other requirements for shovels and drag lines, Gulf supplies a complete line of quality lubricants.



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Thew Shovel Co.

Dirt Moving Equipt. (Dumptor)
Koehring Co.

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Bucyrus-Erie Co.
Harnischfeger Corp.

Draglines
Bucyrus-Erie Co.
Harnischfeger Corp.
Link-Belt Co.
Thew Shovel Co.

Draglines (Gasoline or Electric)
Koehring Co.

Dragline Excavators
Austin-Western Road Machy. Co.
Bucyrus-Erie Co.
Harnischfeger Corp.
Lima Locomotive Works, Inc. (Ohio Power Shovel Co.)
Thew Shovel Co. (Electric, Gasoline and Steam)

Dragline Cableway Excavators
American Hoist & Derrick Co.
Bucyrus-Erie Co.
Good Roads Machy. Corp.
Link-Belt Co.
Sauerman Bros.

Dragline Excavators (Walking)
Bucyrus-Monighan Co.

Dredge Pumps (See Pumps, Dredging)

Dredges
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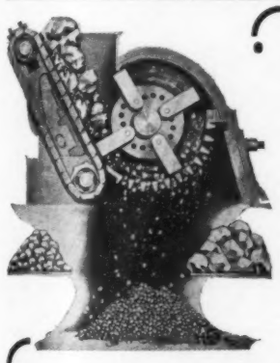

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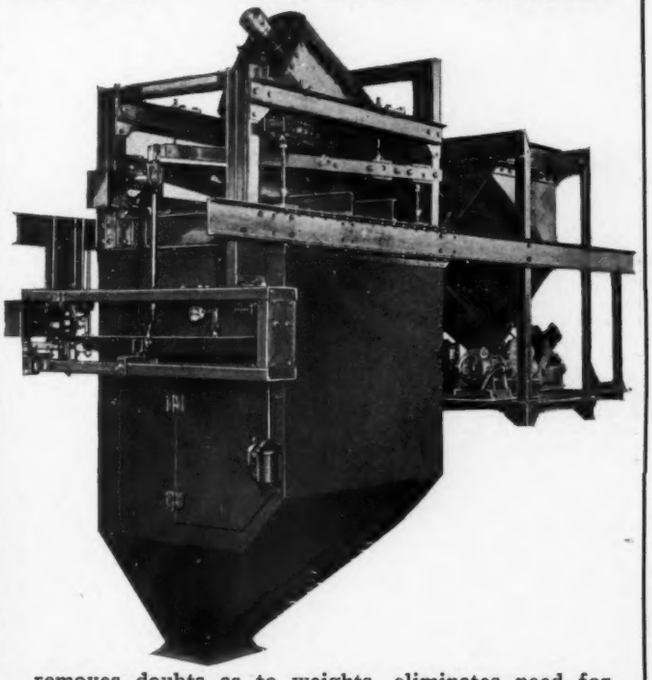

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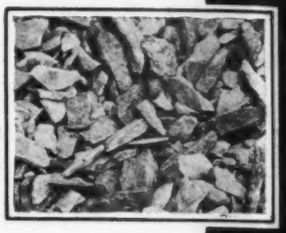

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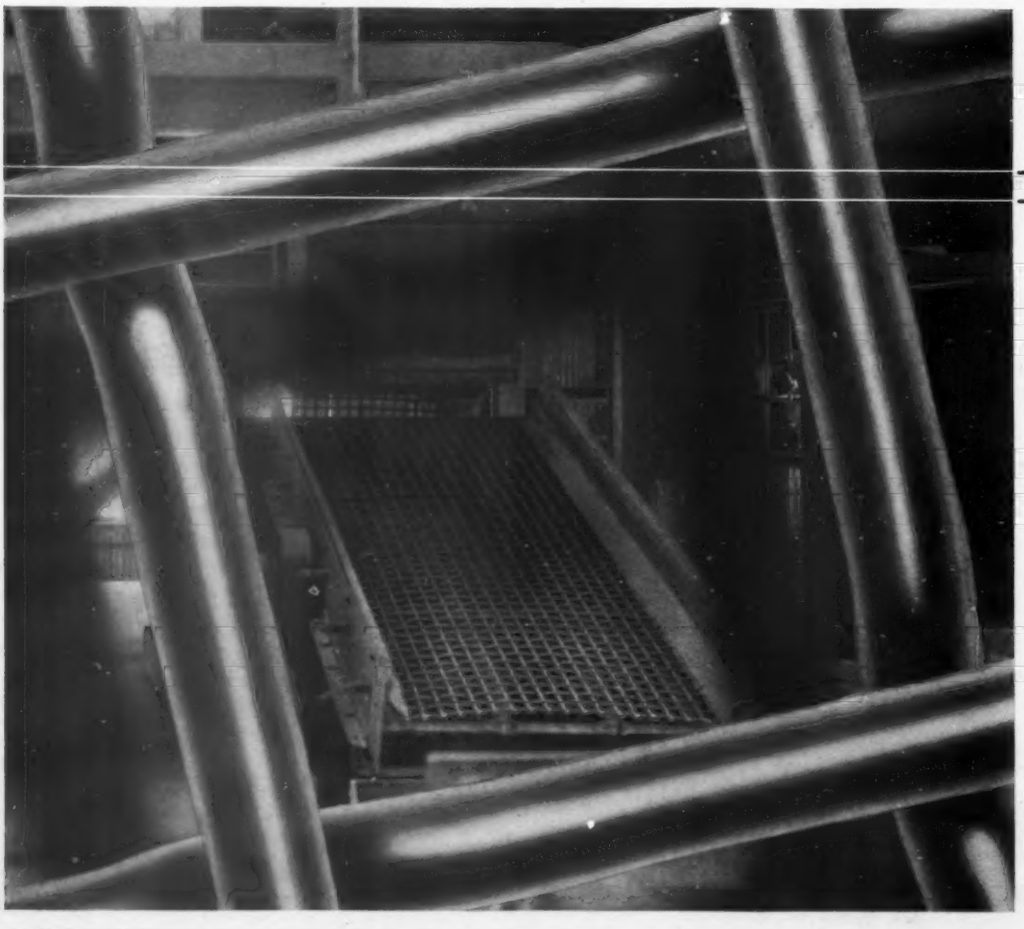

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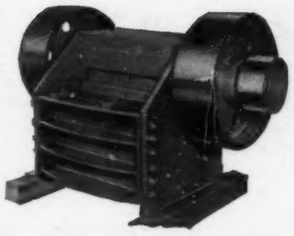

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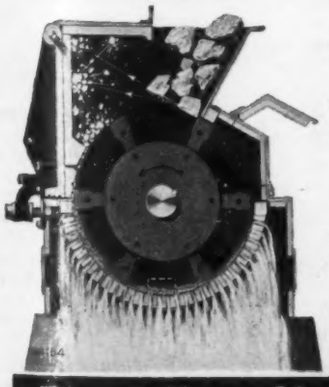

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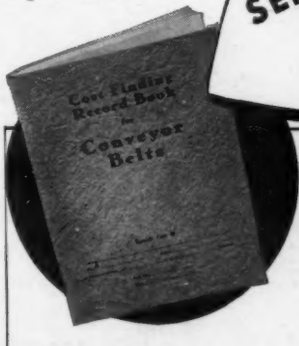

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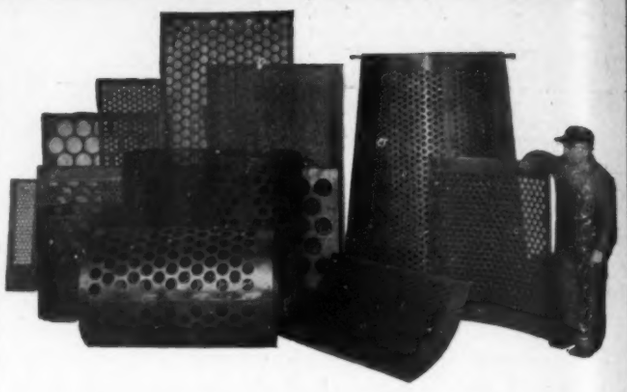

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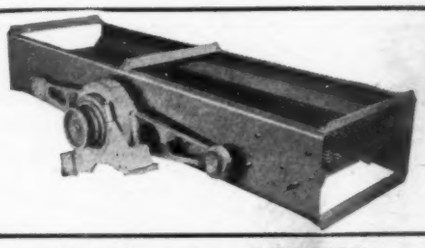

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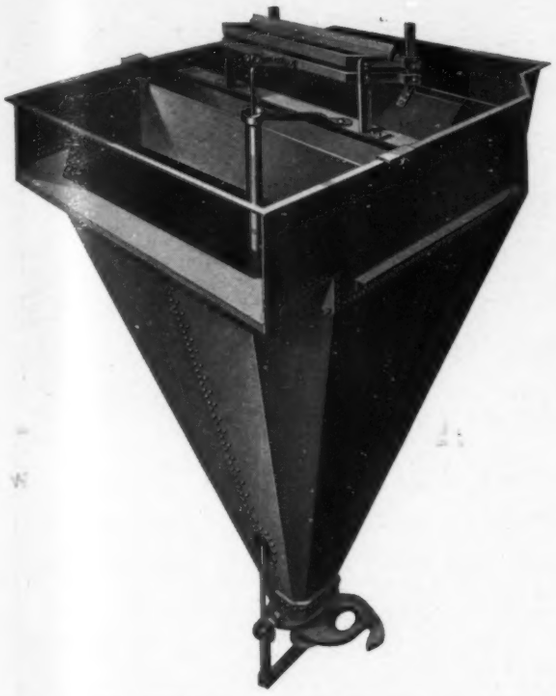

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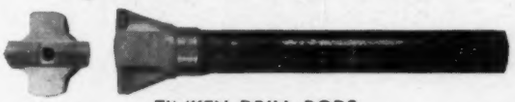

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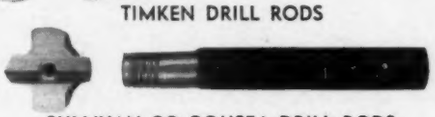

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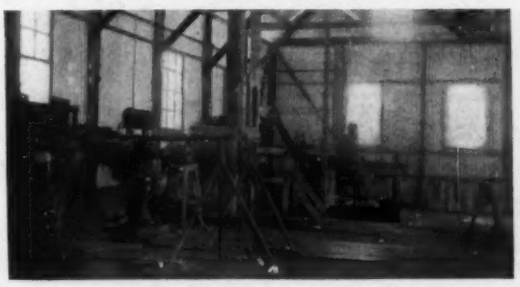

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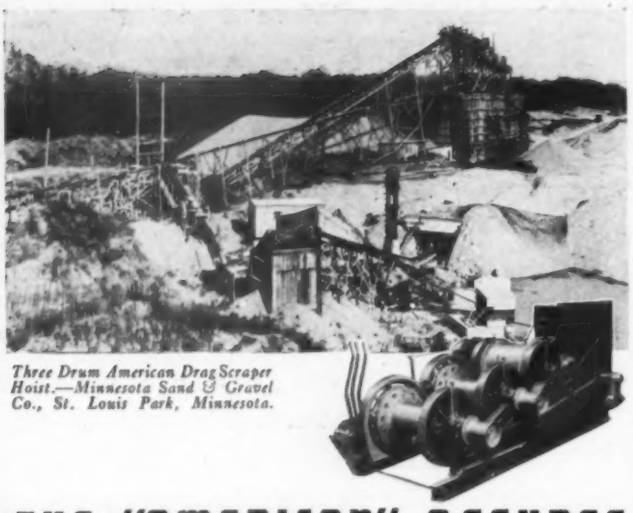

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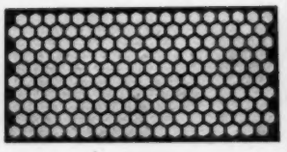

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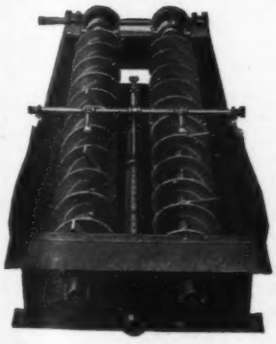

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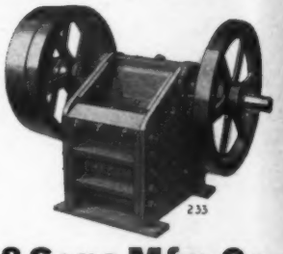

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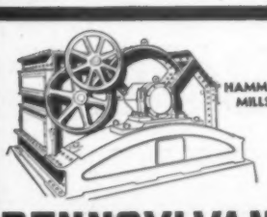

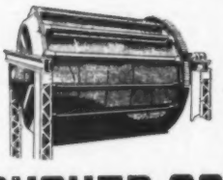

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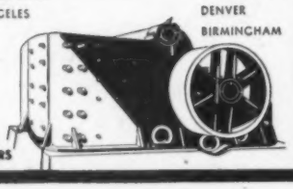

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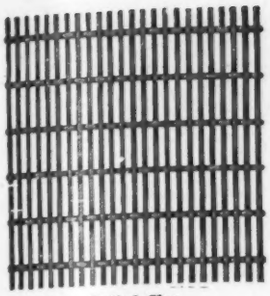

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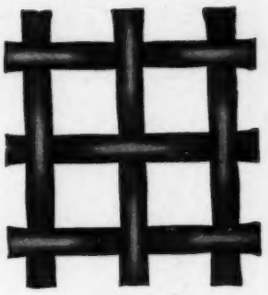

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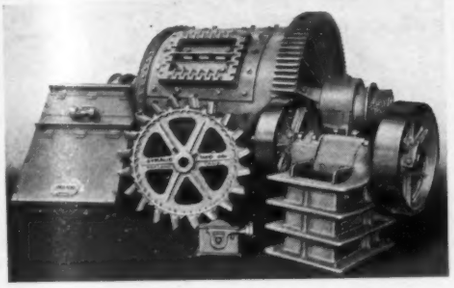

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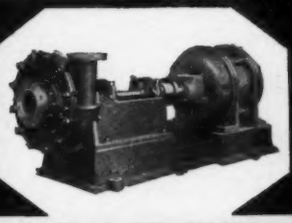

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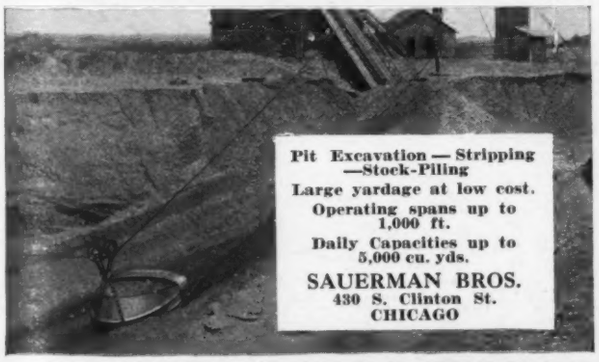

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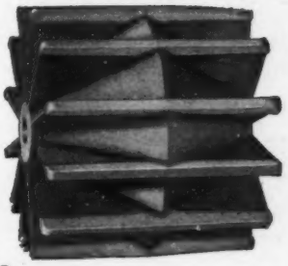

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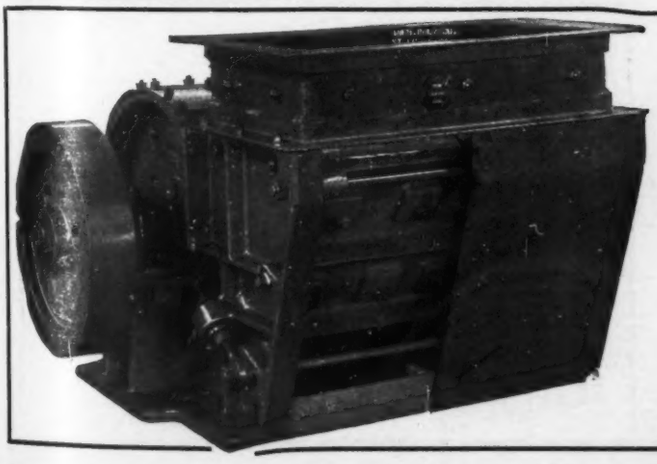

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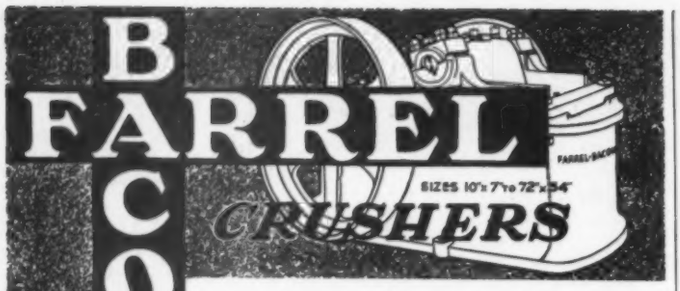

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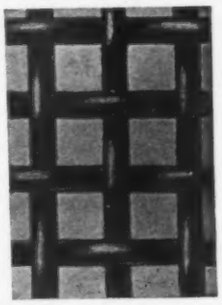

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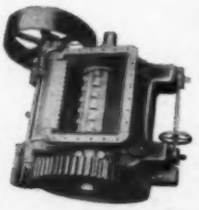

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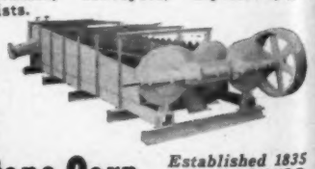
SCREENS
Complete portable, semi-portable and stationary crushing, screening and washing plants for different capacities of any materials.



McLanahan & Stone Corp. *Established 1835* HOLLIDAYSBURG, PENNSYLVANIA

CLASSIFIED ADVERTISEMENTS

POSITIONS WANTED — POSITIONS VACANT—two cents a word. Set in six-point type. Minimum $1.00 each insertion, payable in advance.

INFORMATION
Box numbers in care of our office. An advertising inch is measured vertically in one column. Three columns, 30 inches to the page.

CLASSIFIED — Displayed or undisplayed. Rate per column inch, $4.00. Unless on contract basis, advertisements must be paid for in advance of insertion.

Used Equipment for Sale

LIQUIDATION

NOW UNDER WAY

$10,000,000.00 PLANT OF SPRECKELS SUGAR REFINERY, YONKERS, N. Y.

LOW PRICES FOR IMMEDIATE ACTION

16—4'x5' triple deck, type No. 31 Tyler Hummer Screens.
1—G-12. 15-cycle Generator for Tyler Screens.
6—24" Robins Belt Conveyors, 56', 80', 85', 105', 108', 258' C/C.
1—21"x28" Mead-Morrison single roll Crusher.
1—30"x24" type "A" Jeffrey Mill, d.c., 40 h.p., 3/60/220 volt motor.
1—26" Unique ball-bearing Attrition Mill, with two 20 h.p. A.C. Motors.
1—24" Merrick Weightometer.
23—Heine Water Tube Boilers, 180-lb. pressure; 500 h.p., 408 h.p., 316 h.p.
2—1½-yd. Mead-Morrison Clam Shell Buckets.
3—150 h.p. Westinghouse Synchronous 3/60/220/1200 Motors.
2—Mead-Morrison double drum 32x12 Steam Hoists.
4—Lidgerwood Electric Hoists, each with 25 h.p. motor.
2—Steel Stiff Leg Derricks, 75' mast, 24' boom.
8—10" LeCourtney Centrifugal Pumps, 2400 G.P.M., 170' head, each with 150 h.p., A.C. Motor.
40—Centrifugal Pumps, 8", 6", 5", 4", 3", 1½", direct motor driven.
1—Large complete Machine Shop.
22—Bucket Elevators, steel enclosed.
1—300-amp. Hobart Portable Welder.
200—Electric Motors, all 3/60/22 volts.
2,000 tons of Pipe, full range of sizes.
Hundreds of other items of Screens, Magnetic Pulleys, Rotary Dryers, Meters, Scales, Conveyors, Electric Trucks, Air Compressors, Steam Engines, Exhausters, and general industrial plant equipment available.

Send for Complete 32-page Catalog.

CONSOLIDATED PRODUCTS — SPRECKELS LIQUIDATION

YONKERS, NEW YORK — Telephone: Yonkers 2400. Cable Address: "CONSPRECK"

LOCOMOTIVES

3—50-ton American 4-wheel saddle tanks, 16x24" cylinders, Code boilers, one built 1927.
4—40-ton American 4-wheel saddle tanks 14x22" cylinders, Code boilers, one built 1924.
5—40-ton Baldwin 4-wheel saddle tanks, 14x22" cylinders, Code boilers, built 1924.

LOCOMOTIVE CRANES

1—30-ton American 8-wheel, built 1925.
1—25-ton American, 8-wheel, built 1923.
1—20-ton Industrial, 8-wheel, built 1924.
All have Code boilers.

DUMP CARS

20—30-yard Western all-steel air lift door 2-way side dumps.

Complete stock list on request.

BIRMINGHAM RAIL & LOCOMOTIVE COMPANY
BIRMINGHAM, ALABAMA

2-yd. Marion 480 Shovel-Crane.
1¼-yd. Byers Shovel-Crane.
Lorain 75 Shovel.
1-yd. Koehring Crane.
¾-yd. P. & H. Shovel-Crane.
½-yd. Byers Shovel-Crane.
½-yd. Thew-Universal Crane.
48 Steel Stone Skips 3 and 4 yd.
Compressors: 1300, 1245, 1190, 450, 310, 265, 250, 110 ft.
Draglines and Slacklines, ½, 2 and 3 yd.
Crushers: Telsmith 13A, 40.
Electric Hoists 10, 30, 60, 80, 125 HP.
Derricks—All steel:
3 Guy 15 ton 115 mast, 100 ft. boom.
2 Stiff-leg 10 and 15 ton, 90 ft. boom.
Drill sharpener, furnace and grinder.
Orange Peel and Clamshells: 2, 1½, 1¼, 1, ¾ yd.
Pumps: 1,000 to 5,000 gal.
3—12 ton 36" gauge gas locomotives.

J. T. WALSH
500 Brisbane Bldg. Buffalo, N. Y.

WE CAN FURNISH

All sizes first-class, second-hand and new first-quality

PIPE AND CASING — RAILS — CARS—REVOLVING SCREENS—CONVEYORS — MOTORS — TRANSFORMERS — BOILERS — ENGINES, etc.

SPECIAL OFFERING

2—Allis-Chalmers No. 3 Gyratory Rock Crushers.
2000'—6¼" Threaded and Coupled Casing.
1000'—6" Simplex Prepared Joint C.I. Pipe.
Large Quantity 24" and 32" Steel Riveted Flanged Pipe in 25', 30' and 58' lengths.

SEND US YOUR INQUIRIES

J. ROSENBAUM & SON.
Centerville, Iowa

FOR SALE

12—5-yd. 36" ga. Western Dump Cars.
6—2-yd. 36" ga. Koppel Steel V Dump Cars.
4—1½-yd. 36" ga. Insley Steel V Dump Cars.
2—3½-ton 36" ga. Whitcomb Gasoline Locomotives.
1—9x10 Sturtevant Vertical Steam Engine.
1—10x10x12 Ingersoll Steam-Driven Air Compressor.
1—9x10 Lidgerwood 3-Drum Steam Hoist.
1—8¼x8 Lidgerwood S.D. Steam Hoist.
22—12-yd. Western std. ga. Air or Hand Dump Cars.
2—40-ton Baldwin S.T. Locomotives, 14x22 cyls.
Rails—First-Class Relay Rails and Bars, 60, 70, 80, 85, 90 and 100 lb. Rails, Tie Plates, etc.

HYMAN-MICHAELS CO.
20 N. Wacker Dr. Bldg., Chicago
Railway Exchange Bldg. 101 West 31st St.
St. Louis, Mo. New York

60, 80, 180 and 360 HP. Diesel Engines.
4—750 HP. Busch Sulzer Diesel Units.
15-ton 70-ft. Boom Stiff Leg Derrick.
17-ton Link Belt K-42, 55-ft. Boom Crane.
Bonnot 4x22 Tube Mill & Traylor 6x8.
750-yd., 1250-yd. and 2000-yd. Asphalt Plants.
2—1¼-yd. Thew Steam Shovels.
2—2-yd. cap. Bucyrus Diesel Draglines.
½-yd. Speeder Caterpillar Crane.
Champion 1030 & 1040 Roller Bear. Jaw Crushers.
Pennsylvania SX4 SX6 and SXT12 Hammermills.
368 ft. Chgo. Pneu. Elec. Air Compressor.
150-ton 50-ft. R.R. Track Scale.
3—870-ft. XCB Air Compressors.
Superior 10-in. and 36-in. McCully Crushers.
Traylor 4—10TZ Reduction Crusher.
3—14-ton Plymouth Gasoline Locomotives.
8—3-yd. Koppel V-Shape, 36-Ga. Dump Cars.
Jaw Crushers: 60x84, 42x36, 42x40 and 36x24.

R. C. STANHOPE, INC.
875 Sixth Avenue New York, N. Y.

BARGAINS

THOMAS 12" x 14" STEAM HOIST
Double Drum Without Boiler.

THOMAS 100 H. P. 2-SPEED
Electric Slackline Cableway Hoist

THOMAS 150 H. P. ELECTRIC
Special D. D. Scraper Hoist

Also All Types Single, Double, Three-Drum Hoists—Electric, Steam, Gasoline.

THOMAS HOIST COMPANY
20 S. Hoyne Ave. Chicago

FOR SALE—FACTORY REBUILT DIESEL OIL ENGINES

1—190 H.P. Horizontal Buckeye Engine
1— 75 H.P. Horizontal Buckeye Engine
Each engine guaranteed as new. Belt drives or electric generators can be furnished. Priced right for immediate sale. Liberal terms if desired. Write to

THE BUCKEYE MACHINE COMPANY
Lima, Ohio

ELECTRICAL MACHINERY

Motors and Generators, A.C. and D.C., for sale at attractive prices. New and Rebuilt. All fully guaranteed. Write for List and Prices.

V. M. NUSSBAUM & CO.,
Fort Wayne, Indiana

APRIL BARGAINS

Barber-Greene Loader, Model No. 42..$750.00
3x6 Double Deck Vibrating Screen.. 295.00
24" Symons Disc Reduction Crusher.. 525.00
25 H.P. Waukesha Engines (New)... 45.00
Electric Welder, gasoline driven.... 325.00
All of the above in good operating cond.

S. O. Nafziger, 53 W. Jackson Blvd., Chicago
LIQUIDATOR OF GRAVEL PLANT AND QUARRY EQUIPMENT.

(Classified Advertising Continued on Next Page)

Continued from Preceding Page

USED EQUIPMENT

CONSOLIDATED
GOOD USED EQUIPMENT

Selected Special Items

4—Robins Belt Conveyors, 85′, 105′, 258′ C/C.
1—24″ Merrick Weightometer.
30—Jaw Crushers—36x42 Traylor, 40x42 Worthington, 48x60 Allis-Chalmers Blake; large selection smaller sizes.
12—Farrel Jaw Crushers—4x10, 13x30, 36x42, 42x60.
1—No. 1260 Bakstad Jaw Crusher, 12x30″ feed, 12x60 dis., to ½″.
6—Sturtevant Jaw Crushers, 6x20, 7x24, 10x15 14x26.
2—Symons Cone Crushers, 2′, 5½′.
2—10″ Pumps, each with 400 H.P. 3/60/220 Synchronous Motor, 4000 g.p.m., 240′ head.

SPECIAL

1—8′8″x85′ Ruggles-Coles class A, double-shell, Direct-Heat Rotary Dryer. At Kingsport, Tennessee.

10—3x5, 4x5, 4x7 Tyler Hummer Screens.
2—4x5 Tyler Screens, No. 31, triple deck.
2—Tyler Generator Sets, G-4, G-12.
7—3x6, 4x6, 5x8 Niagara roller-bearing Screens
3—24″x20″ Jeffrey type B. Hammer Mills.
1—36″x36″ Gruendler Hammer Mill, roller bearings.
1—5′x26′ Ruggles-Coles Rotary Dryer—Rebuilt.
4—Raymond High Side Roller Mills, 2, 3, 5 roll.
6—Raymond Pulverizers, No. 0000, 00, No. 1, 3
1—6′x60′ Bonnot Rotary Kiln and Cooler.
2—6′x50′ Rotary Dryers, ½″ shells.
2—6′x35′ Louisville Rotary Dryers, each with fan, steam coils, feeder, collector, etc.
2—4′x30′ American Process direct-heat Rotary Dryers.
1—7′x100′ Vulcan Iron Wks. Rotary Kiln.
1—8′x125′ P.&M. Rotary Kiln.
1—25-ton Truck Scale with Howe Weightograph; NYC.
2—4½′x16′ Hardinge Ball Mills, Tit. lining.
1—6′x22″ Hardinge Ball Mill, herr. gears.
1—3′x12′ Hendy Tube Mill, iron lined.
1—4′x8′ Kennedy Ball Mill, steel lining.
2—3′ Sturtevant Air Separators.
2—8′x8′ Oliver Filters, steel.
1—8′x8′ Oliver Filter, acid proof.

Just a Partial List.

SEND FOR BULLETIN of our regular stock of Crushers; Vibrating Screens; Ball, Rod and Tube Mills; Air Compressors; Rotary Kilns and Dryers; Hardinge Ball and Pebble Mills; Raymond and other Pulverizers; Air Classifiers; Thickeners; Wet Classifiers; Filter Presses; Continuous Filters, etc.

CONSOLIDATED PRODUCTS COMPANY, INC.
15-16-17 Park Row **New York City**
Shops at Newark, N. J., cover 8 acres.

LINK-BELT K42—1½-yd. Gas Shovel, MARION 480—2-yd. Elec. Shovel. Misc. Elec. Motors, 200 to 5 HP., 16 Western 6-yd. Dump Cars, 20 Continental 3-yd. Dump Cars, 2 20-ton and 1 30-ton Std. Gauge Locomotives, Crushers No. 5, 6 and 9. Located in Texas.
1 Marion No. 31 Steam Shovel, 1 cu. yd., located in Indiana.
1 Marion No. 36 Steam Shovel, extra long boom and dipper sticks, located in Michigan.
One 8″x8″ Union Air Compressor.
One 6″ Dean Hill Water Pump with 50 HP. motor.
Two Class J Curtis Air Hoists, 6″ and 7″.
One Double-Drum Sampson Electric Hoist with 15 HP. motor.

ELWOOD SALES AND MANUFACTURING COMPANY
Lafayette, Indiana

FOR SALE

LOCOMOTIVE, 1 5-ton Vulcan, Loco. No. 3872, Engine No. 43793, 36″ gauge. Used one season.

SIDE DUMP CARS, 16, 36″ gauge, all steel 1½-yd.

All equipment in good condition.

Address Box 716, care of Rock Products, 330 South Wells Street, Chicago, Ill.

USED EQUIPMENT

Robins 30″x360′ complete belt conveyor.
Robins 24″x160′ complete belt conveyor.
Robins 18″x150′ complete belt conveyor.
600 assorted sizes trough and return idlers.
L-B 16″x26′ belt conveyor, steel frame.
Conveyor trippers for 18″ and 24″ belt.
Telsmith 20″ plate feeder.
Haiss-Fordson digging loader on rubber.
Chain elevators with 10″ and 12″ buckets.
Malleable elevator buckets, 10″, 12″, 16″.
Hayward and Owen clamshell buckets.
Buda 35 h.p. and 5-8 h.p. LeRoi engines.
Hummer 3x5′ double-deck vibrating screen.
Jeffrey No. 3 jaw crusher with hammer mill.
Kennedy No. 37 gearless gyratory crusher.
Goulds 8″x6″ centr. pump, 22 h.p. motor.
Swivel end dump cars, 24″ gauge, ¾-yard.
Portable track and switches, 24″ gauge.
Hoists, chainblocks, air compressors, drills.
L-B two-roll coal crusher.

G. A. UNVERZAGT
15 Park Row **New York City**

FOR SALE — BARGAIN PRICE
SLACK LINE EXCAVATOR
Meade Morrison 2-speed Slack Line Hoist, No. 18358.
125 H. P. Motor, 80′ Steel Mast.
2-yd. Dragline Bucket.
Address Box 718, care of Rock Products, 330 S. Wells St., Chicago, Ill.

CARS
12-Yd. Western Air, also Hand Dump Cars, Flats, Gondolas, Steel Hopper Cars, Box Cars, Locomotives.

HYMAN-MICHAELS COMPANY
20 N. Wacker Dr. Bldg., Chicago, Ill.
Railway Exch. Bldg. **St. Louis, Mo.**
101 West 31st St. **New York**

We are liquidating the largest surplus stock **best quality NEW WIRE ROPE.**
All sizes ⅜″ to 2″—Black and Galvanized—All Grades and Constructions. Write, wire, phone for our drastically reduced prices.
DULIEN STEEL PRODUCTS, INC.
Woolworth Bldg., 233 B'way, New York; Phone: Cortlandt 7-4676
534 1st Ave. So., Seattle, Wash. Phone: Main 0030-31

RAILS AND CARS
All weights, new and used rails, 12 lbs. to 100 lbs. Portable track, drier cars, all gauges—"V" shape and Western Cars. In centrally located warehouses. Wire or write for prices.

M. K. FRANK
480 Lexington Ave. **New York City**
P. O. Box 1234, Pittsburgh, Pa.

FOR SALE
COMPLETE PLANT FOR HYDRATING LIME
Address Box 729, Care Rock Products, 330 S. Wells St., Chicago, Ill.

FOR SALE
Polysius Size 14 Zet Crusher
12″ x 12″ x 10″—50 Tons Per Hour.
Also G. E. 100 H.P. Supersynchronous Motor for Operating Crusher.
This Equipment Has NEVER been used.
Address Box 722, care Rock Products, 330 South Wells St., Chicago, Ill.

FOR SALE
325 Koppel 36x36″ platform 4 wheel steel frame gypsum block cars 26″ gauge; 14 ball bearing cast iron turntables 41″. Inspection near Buffalo.
Address G. E. Allen
37 Maiden Lane, New York City

USED EQUIPMENT

Jaw Crushers—2″x6″ up to 66″x84″.
Crushing Rolls—12″x12″ up to 54″x64″—Gyratory Crushers.
Ring Roll Mills — No. 0 and No. 1 — Swing Hammer Mills.
Rotary Fine Crushers—No. 1, No. 1½, No. 2.
Direct Heat Rotary Dryers—4′x30′, 5′x30′, 5½′x40′, 6′x50′, and 3½′x25′.
Semi-indirect Heat Dryers, 4′x30′, 4½′x26′, 5′x30′ and 8½′x75′.
Cement Kilns—3′ up to 8′ diameter.
Hardinge—Marcy & Fuller—Lehigh Mills.
Raymond Mills—No. 00, No. 0 and No. 1.
Tube—Rod and Ball Mills—4′ to 8′ diameter.
Complete drying and asphalt mixing plants.
2—8′x72″ Hardinge Mills—90% new.
Air Compressors—One No. 27 I-R oil furnace for drills.

W. P. HEINEKEN
95 Liberty St., N. Y. Tel.: Barclay 7-7298.

ALWAYS TRY US WHEN BUYING OR SELLING
4—21 ton Davenport Locos. 36″ gauge.
2—32 ton American Locos. Std. gauge.
70—4-5 yd. Western 36″ ga. dump cars.
50—12 yd. Western std. ga. dump cars.
28x36″ Traylor. No. 5½ Cone. No. 6 Austin gyratory.
Derricks, Shovels, Compressors, Motors, Turbines, Diesel & Steam Engines, Generators, Tanks, Rails.
MISSISSIPPI VALLEY EQUIPMENT CO.
515 Locust St. **St. Louis, Mo.**

JAW CRUSHER FOR SALE
8″ x 16″ Western with elevator, mounted on steel wheels. Good condition. Price $150.
HAMILTON GRAVEL CO.
Hamilton, Ohio

FOR SALE
Practically good as new. Link Belt Vibrating Scalping Screen, 72″x16′, complete with silent chain drive and 20 H.P. motor with 5 sets extra perforated plates, various sized holes.
THE STURM & DILLARD COMPANY
Columbus, Ohio

Take advantage of the Opportunity offered in the Used Equipment Department to dispose of the equipment that you no longer need.

USED EQUIPMENT WANTED

WANTED
1 Used Manganese Rock Dipper for One-Yard Heavy-Duty Osgood Gas Shovel.
1 Used Manganese Rock Dipper for One and One-fourth-Yard Heavy-Duty Osgood Gas Shovel.
Dippers must be free from cracks and in A1 Condition, Ready to Go to Work.
Southern Ohio Quarries Co., Peebles, Ohio

WANTED—Several Raymond or Williams roller mills of various sizes to be rebuilt for export. Condition immaterial, but must be cheap for cash. Describe fully. Address
Box 696 care of Rock Products
330 South Wells St. **Chicago, Ill.**

"E. C. A. REBUILT" QUARRY and GRAVEL PLANT EQUIPMENT

AIR COMPRESSORS

Portable and stationary, belt, with elec. or gas. power, sizes from 21 cu. ft. to 1,000 cu. ft.

BUCKETS

246—Buckets, all sizes and makes.

CARS

Large lot including std. ga. 6- and 12-yd. and 20-yd., 36-ga. 5-yd., and 24-ga. 1½-yd. Also std. ga. flat cars and ballast cars.

48—Koppel quarry cars, 42" ga. 2½-yd. One-way side dump.

CONVEYORS and ELEVATORS

9—Port. belt conveyors with steel frame, gas. or elec. pr. 18 and 24 in. Barber-Greene and Chic. Automatic.

11—Bucket elevators: 6 Chain Belt Co., Weller and Link-Belt vertical enclosed type; capacities from 35 to 117 tons per hour. 5—Weller inclined type. Nos. 3, 4, 5 and 6 up to 170 yds. per hr.

CRANES (Locomotive)

5—Locomotive cranes; sta. ga., 30 and 25 tons; Ohio, Browning, American, Industrial.

CRANES and DRAGLINES

1—Industrial Brownhoist Model DC Diesel crane, Serial 5176, 60-ft. boom, 1¼-yd. bucket.

1—Northwest Model 104, Ser. 2079, 45-ft. boom, 1¼-yd. dragline or clamshell.

2—Osgood No. 2054, 2069, with 40-ft. boom, 1 with 1-yd. shovel front.

1—Brownhoist No. 2, Ser. 9964, 40-ft. boom, 1-yd. bucket.

1—Link Belt K-1, Ser. 1024, 50-ft. boom, 1-yd. bucket.

1—Industrial Brownhoist type CC, Ser. 5071, 36-ft. boom, ½-yd. bucket.

CRUSHERS

1—Symons coarse cone crusher, size No. 5½, SU No. 521.

1—Set P & M crushing rolls, size 42x16".

2—McCulley No. 3 gyratory crushers.

DERRICKS

Steel and wood, stiff leg, or guy; from 2 to 50 tons, including 2 steel stiff legs; 1—10-ton Insley 80-ft. boom and 1—10-ton American 80-ft. boom.

DRILLS and DRILL SHARPENERS

3—Gardner Denver wagon or derrick drills with Model 21 or 17 Gardner drills for channelling.

25—Ingersoll-Rand and Sullivan jackhammer, column, and tripod drills.

HOISTS

(Electric and Gas)

55—Electric, ranging from 20 HP. up to 125 HP., consisting of triple-drum, double-drum and single-drum with A.C. or D.C. mtrs., some with attached swingers.

38—Gas hoists, ranging from 8 to 120 HP., single, double and triple-drums; all standard makes.

LOCOMOTIVES

32—Gasoline locomotives from 14-ton to 2-ton standard 36 and 24-ga.

3—Steam saddle tank locomotives; 1—24-ton Porter, cyl. 12x16"; standard ga., Ser. No. 5093; 1—19-ton Davenport, cyl. 10x16 std. ga. Ser. No. 2036; 1—20-ton Porter, cyl. 11x16, 36-ga. Ser. No. 6753.

PUMPS

All sizes and types, both force, centrifugal and steam.

SHOVELS

1—Industrial Brownhoist Type DC No. 5176 Buda Diesel eng., 1¼-yd. cap.

1—Northwest Model 105 combination shovel and crane, No. 1846, ⅞-yd. shovel dipper, 40' crane boom.

3—Link-Belt shovel attachments for K-55, K-44, K-42, K-38 or K-2.

EQUIPMENT CORPORATION of AMERICA

Philadelphia
P. O. Box 5419, Kingsessing Sta.
Phone Granite 7600

Chicago
1119 S. Washtenaw Ave.
Phone Nevada 2400

Pittsburgh
P. O. Box 933
Phone Federal 2000

BUSINESS OPPORTUNITIES

WOULD LEASE OR PURCHASE

at an attractive price Crushed Stone Quarry within a radius of 25 miles from Philadelphia, Pa. Address Box 731, care of Rock Products, 330 S. Wells St., Chicago, Ill.

Rock Crusher Plant for sale. Doing nice business. Reliance crusher, steam power. Cheap fuel. Auto. concrete mixer, new tools to carry on, in good condition. $7,500 cash will handle. Unless you have cash ready to investigate for yourself do not answer.

P. O. Box 484, Gastonia, N. C.

Representatives wanted to sell on commission basis a high grade wire cloth used extensively in sand, gravel, stone, coke plants, cement mills, etc. Address Box 707, care of Rock Products, 330 S. Wells Street, Chicago, Ill.

POSITIONS WANTED

POSITION WANTED—FIRST-CLASS MAN, 20 years' experience erecting and operating lime and crushing plants, quarrying all kinds of stone; capable taking full charge of any proposition; moderate salary; prefer connection where eventually he could purchase a substantial interest. Address Box 732, care of Rock Products, 330 S. Wells St., Chicago, Ill.

POSITIONS WANTED

POSITION WANTED AS SUPT. WITH A progressive stone company; 20 years' experience operating limestone quarries and crushing plants; familiar with all modern equipment, efficient handling of labor with record of low cost of production; qualified to assume full charge of any size plant or plants; unquestionable references. Open for engagement. Address Box 654, care of Rock Products, 330 South Wells St. Chicago, Ill.

READY MIXED CONCRETE MANAGER desires permanent connection. Capable design, construction and operation of central or transit mix plants. Thirteen years' experience, concrete construction, materials engineer, and concrete plant superintendent. Experience on six plants in three cities. References. Address Box 730, care of Rock Products, 330 South Wells St., Chicago, Ill.

OPEN FOR POSITION, SUPT. OF QUARRY and crushing plant. Twenty-seven years' experience as Supt.; twenty years on last job, 500 yards capacity. Experienced on all types of crushers and equipment. All positions considered but prefer the South. Can furnish reference as to character and ability. J. H. Burns, 419 Tremont Ave., Charlotte, N. C.

POSITION WANTED AS QUARRY FOREman with cement plant or crushing plant. 25 years' experience operating limestone quarries. Familiar with all modern equipment. Efficient handling of labor and low cost of production. I am expert in the handling of explosives and drilling. Qualified to handle any size plant, unquestionable reference. Address Box 712, care of Rock Products, 330 S. Wells Street, Chicago, Ill.

CONSULTING ENGINEERS

H. J. BROWN
CONSULTING ENGINEER
35 Doane Street, Boston, Massachusetts
Specializing in Gypsum Plants and in the Mining, Quarrying and Manufacture of Gypsum Products.

Consultation	**Design**
Examinations	**Construction**
Reports	**Supervision**

WE LOOK INTO THE EARTH
By using Diamond Core Drills. We drill for Limestone, Gypsum, Talc, Fire Clay, Coal and all other minerals.
PENNSYLVANIA DRILLING CO.
Drilling Contractors
Pittsburgh, Pa.

H. D. RUHM
Consulting Engineer
Dealer in PHOSPHATE LANDS and all grades of rock.
10-mesh PHOSPHATE FILLER, $3.00 net ton
40 years' experience TENNESSEE PHOSPHATE FIELD. Correspondence solicited. Can find what you want if it can be found.
305 West Seventh St., Columbia, Tennessee

POSITIONS VACANT

WANTED—EXPERIENCED MANAGER OF Sales of Lime and Limestone Products. Applicant must state experience, age and education. Address Box 721, care of Rock Products, 330 South Wells St., Chicago, Ill.

ALL DOWN THE LINE—

Every last man in your plant can profit by reading ROCK PRODUCTS regularly. It will help him to bring new interest and new efficiency to his job.

Rock Products
With which is incorporated CEMENT and ENGINEERING NEWS Founded 1908
330 S. Wells St., Chicago, U.S.A.

See to it that ROCK PRODUCTS reaches you regularly—and pass it around! Subscriptions for the keymen would be mighty good investments.

We produce:

- ☐ Crushed Stone
- ☐ Sand & Gravel
- ☐ Glass Sand
- ☐ Lime
- ☐ Sand-Lime Brick
- ☐ Gypsum
- ☐ Phosphate
- ☐ Cement
- ☐ Slate
- ☐ Talc

Other Materials.....
We retail.....

Date....., 1936

Please enter my subscription to ROCK PRODUCTS for.....year..... (three years $5.00, one year $2.00—please state which. You save a dollar by subscribing for three years), for which we enclose $.....

Name.....

Street.....

City..... State.....

Canada $2.00. Foreign Subscriptions $4.00 a year

Style "B" Newhouse Crusher

FOR GREATER PRODUCTION

and uniform product

NEWHOUSE Crushers, with their short rapid crushing action, meet the industry's requirements for large capacities, high reduction, and uniform product. The large unobstructed receiving openings permit easy feeding. The drive is direct by an electric motor mounted above the crusher spider. There are few working parts, all readily accessible, and no gears or belts.

Reversible, non-choking concaves are furnished as standard equipment except for small feed and fine product. A new type of dust seal positively prevents leakage of oil and prevents dust or water from entering the eccentric bearing.

This crusher unlike all others does not require an expensive permanent foundation. It is suspended from the plant structure by means of three cables that not only support the crusher, but also absorb the vibration and shock of crushing and prevent it from being transmitted to the supporting structure.

We would like to show you operating records of these modern crushers and how they have saved money in many crushing and mining plants. Get in touch with the nearest Allis-Chalmers office.

ALLIS-CHALMERS

— Allis-Chalmers Manufacturing Company, Milwaukee, Wisconsin, U.S.A. —